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AND EXTRA CHARGE

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EDITORIAL

THE popularity of collapse therapy in pulmonary tuberculosis is steadily growing, and in this number we review a book of over 700 pages by Dr. John Alexander dealing entirely with various methods of collapse.

Pneumothorax, although suggested as a method of treatment many years ago, did not really begin to become recognised in this country until after the war. Now one finds that in every institution a large number of patients are having the treatment, and in addition to this surgical methods are increasing, so that there are in most sanatoriums surgical departments.

In certain cases a complete thoracoplasty has dragged a patient from the edge of the grave, and there is no doubt that this is still the best method of treatment for a certain type of case. We have, however, always maintained that it is a bad operation, and one that as time goes on will be supplanted by newer and better methods. Attempts have been made to perform an upper thoracoplasty alone, and this sometimes has met with considerable success, although the disease frequently spreads into the lower part of the lung and necessitates the partial thoracoplasty being converted into a complete one at some future date.

Apicolysis is performed by the introduction of wax. Although not popular in this country, it has met with a limited success elsewhere and is a procedure far less severe than thoracoplasty.

A combination of upper-stage thoracoplasty and apicolysis, such as performed by Semb, has also produced satisfactory results, especially in closing apical cavities when pneumothorax is impossible owing to adherent pleura.

More recently extra-pleural pneumothorax has been performed. This operation was tried some years ago, but it was found that surgical emphysema

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followed and that the pneumothorax could not be maintained. With modern technique, however, it is possible to get quite a satisfactory collapse in the upper part of the lung which can be maintained by refills.

It is as yet too early to tell what the late results of cases so treated will be, but at any rate it is a promising method of obtaining an upper collapse, and even if not finally successful will at least render the patient more suitable for subsequent operation.

The paper by Dr. Brooks which will be found in this number describes a new and ingenious method of closing cavities, and it is not too much to hope that the time when a complete thoracoplasty will be merely a matter of historic interest is not too far distant.

Apart from these surgical methods, progress in recent years has been made in the direction of after-care. When a patient breaks down after sanatorium treatment it is usually within a few months of leaving the institution. It is becoming more and more recognised that he should be protected for the first year or so after completing the sanatorium treatment. This has been the idea at Papworth, where patients are enabled to do part-time work, permanently if the disease is not fully arrested, or for a short time until he has reached the stage when he is able to do full work in the open market.

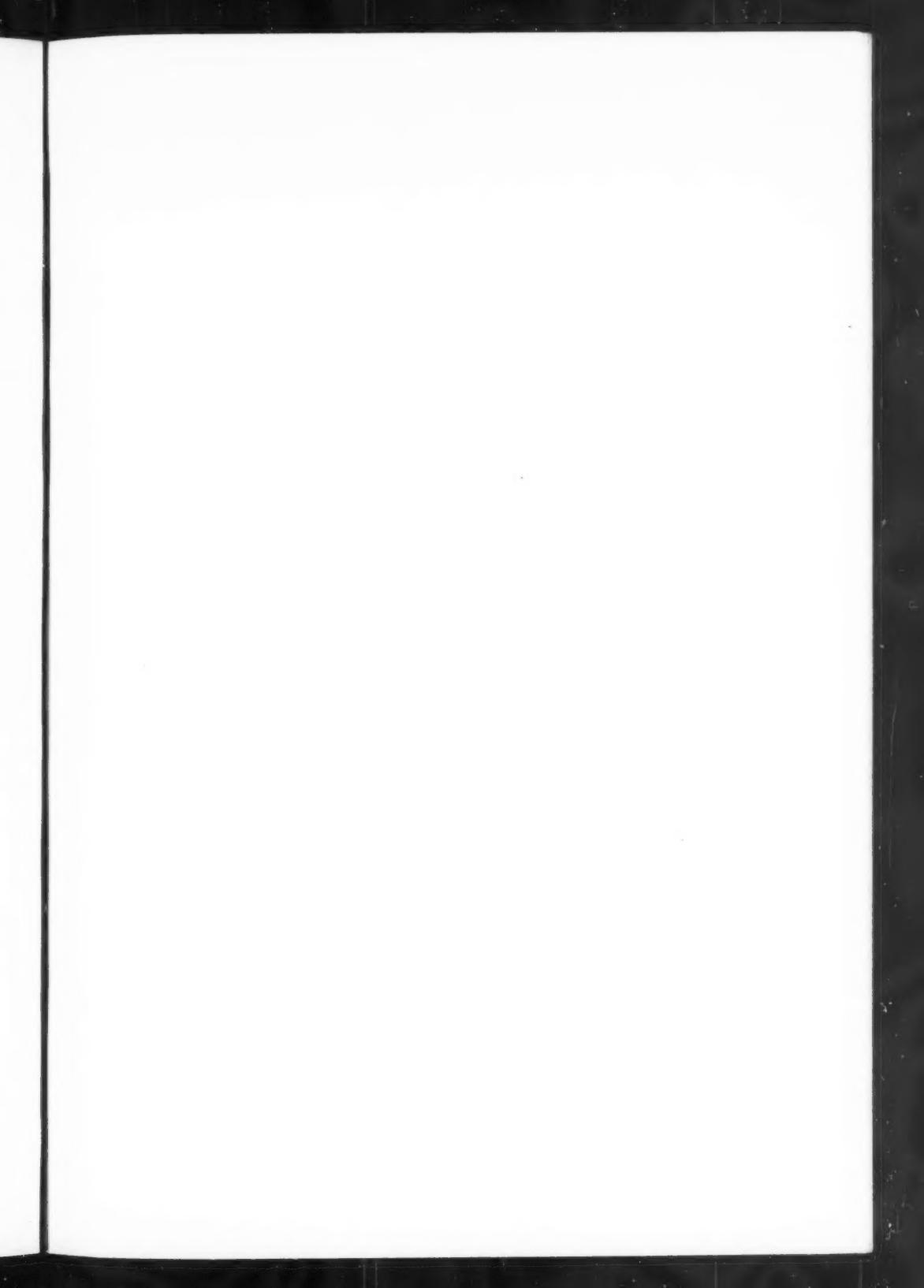


PLATE I

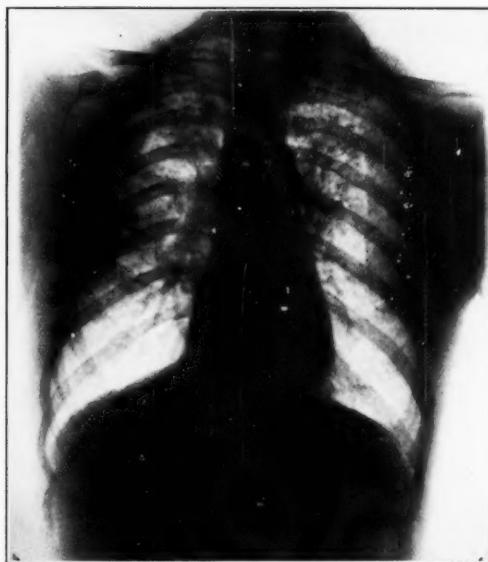


FIG. 1.—SHOWING EXTENSIVE DISEASE IN BOTH LUNGS, MAY, 1936.

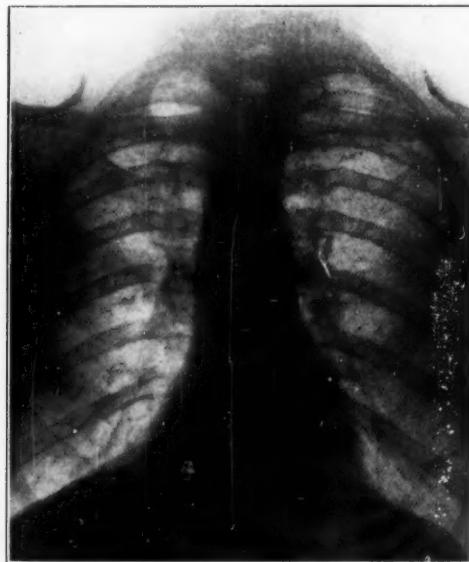


FIG. 2.—THE SAME PATIENT IN NOVEMBER, 1937.

[To face page 3.]

TYPES OF PULMONARY TUBERCULOSIS

1. A CASE OF SUB-ACUTE MILIARY TUBERCULOSIS

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THE patient, a man of thirty-nine, had always enjoyed good health and had never been away from work through illness. In the spring of 1936 he began to grow husky and developed a slight cough. His weight, temperature, pulse and general condition remained good, and he was able to continue his work without any undue fatigue. Examination showed redness and swelling of the right vocal cord with a papillary growth on its anterior third.

There was broncho-vesicular breathing at the root of the right lung, and at the right apex in front and behind moist sounds could be heard. No signs were found in the left lung, but X-ray (Fig. 1.) showed fine mottling of the miliary type over the upper two-thirds of both lungs. The sputum contained tubercle bacilli in large numbers.

He went to Montana Hall Sanatorium in Switzerland under Dr. Roche in May, 1936, and on arrival a radiograph showed the changes already described; the blood sedimentation rate (Westergren) was 42 mm. in two hours, the sputum was strongly positive for tubercle bacilli, but his temperature was never over 98.6° nor his pulse over 80. There was ulceration of the right vocal cord. He was given a course of complete rest and sanocrysin injections. After two months the sedimentation rate had fallen to 28 in two hours, the vocal cord was better but still showed ulceration, there were only a few tubercle bacilli in the sputum, and the temperature and pulse remained normal; he had gained 7 pounds in weight. There was, however, no appreciable change in the X-ray appearance. Tubercle bacilli were absent from the sputum for the first time on

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October 31, by which time he had had 3·15 grammes of sanocrysin. By the middle of December the sedimentation rate was 10 in two hours, sputum had been only once positive since October, X-ray showed a definite improvement in the lungs, and the larynx was slowly getting better. He had finished the course of sanocrysin, having had 5·45 grammes.

He returned to England in June, 1937, by which time he was free from symptoms, and the condition of the larynx had cleared up except for a little thickening of the cord. He returned to work in July and in November was still keeping fit and free from symptoms, the X-ray appearances being shown in Fig. 2.

Discussion.

The interesting features in this case are the extensive involvement of the larynx and both lungs with large numbers of tubercle bacilli in the sputum, but with very little systemic disturbance, although the sedimentation rate was bad.

The steady improvement which followed rest in the dry Swiss air and small doses of sanocrysin, and in the final result the complete clearing up of the larynx and of the lung except for a little fibrosis in the upper zone of the right lung, were truly remarkable.

GENERAL ARTICLES

TUBERCULOSIS IN NEW ZEALAND

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IN this paper it is proposed to discuss the tuberculosis problem in New Zealand under the following headings as being of most interest to those living beyond our shores:

- (1) Our methods of dealing with the disease and the results obtained to date.
- (2) The problem of the Maori population.
- (3) The climatic factor.

In New Zealand the responsibility for the care and treatment of the sick, with the exception of mental diseases, is vested in Hospital Boards elected on a parliamentary franchise every three years. Each Board has a well-defined district, and its revenue comes partly from local rating and partly from a Government subsidy, the English voluntary hospital system being thus non-existent in this country.

Until the beginning of this century nothing was done for the consumptive, and when representations were made in Parliament to induce the Government to act in checking the spread of the disease and establish special institutions for treatment, the attitude of the Government of the day was that phthisis was a hereditary disease and that a considerable proportion of the existing cases were not true New Zealanders, but had come from England for curative purposes; that it would be a mistake to build sanatoria, because it would be an inducement to these people to come to the Colony; and, further, that the most effective means of grappling with the disease was to pass an Undesirable Immigrants' Bill and stop consumptives from coming here.

However, more enlightened views soon prevailed and the first step was taken in 1901, when pulmonary tuberculosis was made a notifiable disease,

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and the following year a small sanatorium was opened in the North Island under Government control. A special Public Health Department was formed, and this department has ever since confined its efforts chiefly to the preventive side, leaving the question of treatment to the Hospital Boards controlling the various hospitals throughout the country.

In the four large towns there is a special hospital institution for advanced cases, whereas the smaller hospitals have some tuberculosis shelters attached to them for this purpose.

The earlier cases are sent to sanatoria, of which there are five, situated in ~~more~~ favourable surroundings.

The number of such beds totals 625, and those for advanced cases 385, making a total of 1,010. The population of New Zealand is approximately 1,500,000, so that is one bed for every 1,500 inhabitants.

In 1934 there were 491 deaths from pulmonary tuberculosis in New Zealand. This figure gives approximately two beds to every death, and in the same year there were 890 notifications, so that the bed-space exceeds even the notifications, though admittedly only 625 are actual sanatorium beds.

The death rate from pulmonary tuberculosis has fallen from 75 per 100,000 in 1900 to 33 in 1934. This country has one of the lowest, if not actually the lowest, death rates in the world from tuberculosis, both pulmonary and non-pulmonary. This no doubt is due, in part at least, to the energetic campaign that has been waged against the disease, especially in the last few years, when clinics, visited at intervals by special tuberculosis officers, have been established even in the smaller outlying districts, whereas formerly these existed only in the four main centres.

Tuberculosis in the Maoris.

This condition constitutes a serious problem for the health authorities in New Zealand. It is a well-known fact that tuberculosis is much more prevalent in the native races than in Europeans, but the notification of morbidity and registration of Maori deaths are admittedly most imperfect. Very welcome, then, was the very painstaking survey of a group of 2,000 Maoris in the East Cape district of the North Island, undertaken by Dr. Turbott of the Health Department a few years ago.¹

Living as I do in the South Island, where the Maori population is only 3,000 as compared with 70,000 in the North, I have had little opportunity of gaining any personal knowledge of this subject, so that for most of my remarks I am indebted to Dr. Turbott. The Maoris in the South Island live practically as Europeans, and the health problem is in consequence not as acute as in the North Island.

The total incidence of tuberculosis in this group of 2,000 Maoris, which is fairly typical of the Dominion as a whole, was 115, equal to a rate of 56.8 per 1,000. Of special interest is the fact that over 90 per cent. of these cases occurred in those with more than half Maori blood, and over 70 per cent. were three-quarter caste Maori.

The mortality rate was found to be 494 per 100,000. Compare this with the corresponding European figures for 1934—viz., 42 per 100,000. The law at present allows Maori deaths to be registered without a death certificate, consequently the sources of information are most unreliable and include an unduly large number made of the statements of relatives only.

As regards notification. The number actually notified in this area under consideration was 5 in a year, whereas Dr. Turbott found 83, none of whom had previously been notified. This diagnosis was confirmed by X-ray examination. Of this number, 53 were found to be active and 30 arrested. Here it is appropriate to add that the Maori race is obviously building up some sort of immunity to tuberculosis, and is not being overwhelmed by the disease, like so many other native races.

The reasons for this unfortunate state of affairs are not far to seek. Their general economic condition is very poor. As a standard for economic sufficiency or otherwise Dr. Turbott fixed the weekly sum per family of 10s. irrespective of the size of the family. In 13 per cent. of cases even this low standard was not reached. Overcrowding was generally evident, at least one-third living in very imperfectly constructed Maori dwellings, built of slab walls, earth floors, and maybe raupo or iron roofs. The rest lived in the European type of dwellings, often in a sad state of neglect, and many of both kinds only meriting the word "hovel."

Sanitation was very elementary both in regard to water supply and disposal of refuse and human excreta. The furniture was very meagre, though only a small proportion was actually considered dirty. The common use of equipment was very apparent, and promiscuous spitting was often noted, a habit particularly common in the older generation. Diet was very poor, consisting mainly of potatoes, corn, meat sometimes, bread, and tea, obviously deficient in disease-resisting qualities.

In association with all these insanitary and unhygienic conditions is an amount of ill-health and misery that would be intolerable to the white man. And what makes the rectification of this state of affairs is the Maori outlook. He appears to be unaware of his plight and indifferent to efforts made on his behalf. He is essentially a fatalist in his attitude to tuberculosis. It was often alluded to as the Maori disease or wasting sickness, and as it was regarded in the light of an affliction from heaven the intervention of the white man was generally futile. It is a commonplace observation

in a sanatorium that the Maori often makes no effort whatever to get better and is quite content to lie down and die, not as a rule in an institution, for the relatives prefer them to die at home and will go to almost extreme lengths to get their people out of the clutches of the white man. Custom demands that death should take place in their own homes. This fact is seen in the reluctance with which a Maori will enter a hospital for treatment of any kind, though prejudice of this kind is undoubtedly being overcome and they are now entering institutions in increasing numbers.

The gradual adoption by the younger generation of European standards of life and education of the young is slowly making itself felt, with the result that, though much obviously remains to be done, the Maori population is in no danger of extinction from disease. They are on the whole, and given equal opportunities, a very fine type of native race and well deserve preservation from the ravages of civilisation. Of late years an unmistakable increase in the Maori population has been evident, though no doubt accompanied by a considerable dilution of blood. This in spite of a much heavier general, and in particular tuberculosis, mortality.

Climate.

In comparison with the climate of the British Isles we find that New Zealand, with a considerably lower latitude, still has only a mild temperate climate, and not, as many are inclined to think, a sub-tropical one. This may be in part due to the frequent association of New Zealand with Australia in the popular mind. The range of conditions in this country comes within that recorded in the British Isles, though the mean temperatures are from 5° to 6° F. higher and the range of temperature from North to South is greater owing to the greater extent of latitude.

Like the British Isles, New Zealand has a maritime climate, there being no part of the country more than about 70 to 80 miles from the sea. High mountain ranges in both islands, and especially the Southern Alps in the South Island, profoundly affect the climate on the west and east coasts, and this, in association with the vast expanse of ocean surrounding New Zealand, probably accounts for some important differences from the British Isles.

Mean temperatures are considerably higher, but a very important feature is that the range of the monthly temperatures is, on an average, 3° F. greater in Britain. Consequently the New Zealand winter is comparatively mild and a certain amount of growth of vegetation takes place all the year round. There is green feed at all seasons, stock can remain out of doors and unprotected, and hand-feeding is reduced to a minimum. These conditions, associated with the rainfall, make New Zealand what is probably the richest grazing area in the world.

Again, a much greater daily range of temperatures exists than in Britain, and is similar to that of the Australian coast, which is, of course, backed by a continent. This feature is surprising in a small maritime country, and averages about 17.5° F. The result is that the nights are seldom hot and bed-clothes are always necessary. This large daily variation is probably a valuable bracing influence in the climate. It helps to prevent air stagnation in any one area, and, along with the mountainous nature of the back country, tends to atmospheric clarity, bright sunshine, and a black night sky by discouraging cloud formation. These features of a colonial climate at once attract the attention of the visitor, whilst, on the other hand, New Zealanders visiting England find the smoky haze very depressing.

The average sunshine record for the country is about 2,000 hours, ranging as it does from 1,500 to 2,500 hours, but it is more evenly spread over the twelve months, and whilst in an English summer there may be greater spells of sunshine, few places in New Zealand have less than 100 hours a month, and it can be, and frequently is, delightfully warm in the sun in mid-winter.

As regards the rainfall. It is fairly heavy, though it varies considerably on the west and east coasts, owing to the mountain chain previously mentioned. Most of our rainfall comes from north-westerly winds from sub-tropical regions. It strikes the mountain ranges, with a resulting high precipitation on the west coast, making the annual rainfall there upwards of 100 inches in the South Island, though it is less in the North Island, where the mountain chain is not so formidable. The east coast, which accounts for a big proportion of the whole country, has a rainfall considerably less than this, and ranges from about 15 to 30 inches in most parts. These topographical differences, with the resulting effects on rainfall, naturally influence the industries of the country, dairying being the chief natural industry of the west coast, while sheep predominate on the hilly country on the east side and wheat-growing on the plains.

As is to be expected, New Zealand is a windy country, though the mean strength of winds does not appear to be very high, but the broken nature of the surface results in them being extremely gusty, and also perhaps in people being more exposed to their effects than in most countries. The young and vigorous no doubt do not mind, but older people and the sick who have to undergo outdoor treatment naturally find them colder than seems warranted by the temperatures. These prevailing winds do undoubtedly militate against the full use of our sunshine and clear skies, especially when the question of heliotherapy is raised.

Snow is not of much importance in New Zealand. It is practically unknown at sea level, though in the South Island it may lie for a few days

in the year on the coastal plains. The permanent snow-line is about 7,000 feet in the mountains of the South Island, where there are several peaks over 10,000 feet. However, most of the areas where conditions might approximate to the Swiss Alps are more or less uninhabitable, and certainly in the present state of the country's development inaccessible for the sick.

It is difficult to assess with any degree of accuracy the humidity. The commonest percentages in New Zealand are between 70 and 80. On the whole, humidity conditions are quite favourable for health and comfort, though in the far north the summer is rather humid. Here citrus fruits can be grown quite successfully.

To sum up, whilst the climate of this country by no means can be claimed as a particularly suitable one for tuberculous people, it no doubt has some advantages over the British Isles and many parts of Europe. There is plenty of sunshine over most parts of the country. There are no extremes of heat in the summer, and, on the other hand, there is a fair amount of winter sun, which can be quite warm at times. The daily range of temperatures is about 17° , and this tends to have a bracing influence on the climate. The rainfall is not excessive in the populated areas, which are chiefly on or near the coast-line.

New Zealanders are thus able to live a great deal out of doors and spend their holidays tramping, fishing, hunting, and so on. Roads are remarkably good considering the age of the country, and travel is thus easy even by motor. Organised games, both summer and winter, are very popular. This mode of life must have some bearing on our health statistics.

The general standard of life is higher than in the Old Country. Wages are higher, working hours are shorter (the forty-hour week has recently been introduced for many trades), and working conditions are generally good. The basic industries of the country are primary, and so there is a large farming population. Sanitation and housing conditions are good. Slums as they are known in older countries do not exist. Open-air schools have of late become a more or less standard pattern for new schools being built, and even old schools have in many cases been remodelled to bring them into line with more modern ideas.

Social legislation is advanced, and the State looks after the economic and physical welfare of the needy and the sick. It would indeed be surprising if our tuberculosis death rate were not one of the lowest in the world, living as we do under such comparatively ideal conditions. So that while our climate has nothing particularly to commend it to the sufferer from tuberculosis, the general living conditions—and this, of course, includes climate—are such that tuberculosis is by no means the ugly monster it appears to be in the older and more closely settled parts of the globe.

My thanks are due to Dr. Kidson, New Zealand Government Meteorologist, for much of my information on climate.²

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THE TUBERCULOSIS PROBLEM IN INDIA

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On the invitation of Sir Pendrill Varrier-Jones I am sending this short paper as a "message" to the Empire Conference on the Care and After-Care of the Tuberculous.

The tuberculosis problem in India comes to one's mind as the natural subject with which such a "message" should be concerned. It is, of course, out of the question to deal exhaustively with a subject so wide and complicated in a contribution like this, but I should like to draw attention to a few aspects of the problem and to venture some suggestions.

In planning out a campaign against tuberculosis in India one cannot but fear that much money and much human effort and energy will be more or less wasted, unless there has first been worked out a definite tuberculosis policy founded on a scientific investigation. This is necessary to get a full knowledge both of the epidemiology of the disease under the conditions prevailing in this country and also of the predominant type of the disease which has here to be dealt with.

Up till now very little of this preliminary survey work has been carried out in India, either generally or in detail, with regard to different areas, different climatic conditions, different communities or different occupations. We are just beginning to get an inkling of knowledge of the actual conditions in towns and villages concerning the tuberculous infection and the severity of the disease. As an illustration of this I may be allowed to refer to a paper read at the Empire Conference by Dr. P. V. Benjamin entitled "The Indian People and Tuberculosis." In this attention is drawn to the comparatively high incidence of tuberculous infection in the villages of

a certain area investigated by our sanatorium, yet with a surprisingly small amount of actual disease in the same area. At the same time, as far as can be judged from the scanty information available, villages in other areas are not only heavily infected, but have also much disease of the most severe type. Why this difference should exist needs much investigation.

We have reason to believe, as far as our research goes, that economic, social and hygienic factors play a far less important part in producing the severe exudative type of pulmonary tuberculosis met in India than is generally supposed. There seems to be some factor or factors which leads to the development of active disease from infection, and which cuts across differences of town and village, wealth and poverty, community and Indian race. A knowledge of this factor or factors can only be obtained by a study in India itself, as the type of disease resulting is so different from that in the West. This study has to be carried out, as on the basis of it alone can a scientific and efficient campaign be worked out against tuberculosis in India.

Such an investigation will, by its nature, take years, and it might lead to great disappointment in the meantime to introduce uncritically a campaign based solely on European experience. It has to be emphasised that a satisfactory tuberculosis policy in India cannot be worked out merely by choosing one or more links of the campaign found useful in the West and transferring them to an entirely different set of conditions such as those existing in India, and here using them in isolation from the whole framework of which they originally formed an inseparable part and to which they owe their success.

In the West the tuberculosis clinic is one of the most important links in the whole campaign, but in India the money spent on tuberculosis clinics is often out of all proportion to the value derived from them. The reason for this is that they are sometimes established in towns without any facilities for treatment in hospital or sanatorium of patients for whom ambulant treatment is unsuitable. With the severe type of tuberculosis found in India, ambulant treatment is not only impossible for the majority of patients, but is actually a danger to them and through them to their surroundings.

It would, to mention another example, be almost disastrous to establish a series of tuberculosis colonies in India, if patients were to be admitted to them directly from clinics. The full value of colonies comes only when they are working in connection with tuberculosis hospitals and sanatoria in which the patients have first had an opportunity to build up a certain resistance against the disease in preparation for receiving the benefit to be obtained in a colony. The more severe the type of the disease, the more necessary is it to have the preliminary treatment and preparation. It

may also be necessary to transfer a patient back from the colony to the hospital or sanatorium in the event of a temporary breakdown.

On the other hand, sanatoria and hospitals without the co-operation of clinics and colonies would be incomplete and the general campaign against tuberculosis would be handicapped.

In thinking of the formation of a tuberculosis policy for India I would venture to suggest that a comprehensive investigation be begun, directed by some central body such as the Indian Research Fund Association, or a central tuberculosis association, so that work in different parts of India could be co-ordinated and correlated.

The investigation should be along two lines. The first is a survey of the incidence not only of infection, but also of the incidence of active tuberculous disease. The other is an investigation of the methods of combating the disease, which should include a study of the importance of environment and race and other factors, and the part they play in the spread of the disease. At the same time it should include also a study of the methods of treatment and isolation best suited to Indian conditions. Such an investigation must take many years and must be undertaken by doctors specially trained for this work and wholly engaged in it, without private practice. Special areas, both rural and urban, should be chosen for this type of investigation.

In these areas facilities for modern and efficient treatment might be provided along cheap lines, using buildings of very light construction in temporary hospital camps, sanatoria and colonies, not too different from buildings found under ordinary Indian conditions and not requiring huge capital outlay, but such as, if found suitable, could be multiplied all over India. Although the final conclusions to be drawn from an investigation of this kind would require a period of many years, it should, however, not take long before valuable information would be had which could be used in other parts of the country.

During the last years public interest in India has been widely aroused about the tuberculosis problem and an increasing demand is being made for a definite tuberculosis policy. It would be deplorable if this pressure of public opinion, claiming that something should be done on a larger scale, were to lead to an unconsidered and unnecessary large outlay of capital expenditure in various ways before a thorough scientific investigation has shown both what has really to be done and the way in which it may best be carried out under the conditions that exist in India.

AN ANCILLARY METHOD IN THE TREATMENT OF PULMONARY TUBERCULOSIS

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Introduction.

DURING the last thirty years perhaps the most important change in the treatment of pulmonary tuberculosis has been the introduction of various measures designed to produce collapse of the diseased areas of the lungs. Experience during this period has taught us that if such collapse is obtained, as a rule healing of the lesions tends to occur, and the prognosis is correspondingly improved. It is now generally agreed as regards therapy of this kind that the ideal procedure should carry with it a minimum of danger to the patient, should achieve selective collapse of the diseased areas of the lungs, and should conserve unimpaired the healthy pulmonary tissue. In practice, whatever the method employed may be, it is relatively uncommon for this ideal closely to be approached. For example, under favourable circumstances selectivity of collapse is achieved (by compression) in the modern operation of thoracoplasty. The procedure, however, carries with it a not inconsiderable risk to the patient. At the other end of the scale phrenic evulsion, while rarely involving the patient in danger on its own account, is scarcely if at all selective in the collapse or relaxation it produces, and it impairs the efficiency of the whole lung. Selective collapse occurs in a minority of cases in which artificial pneumothorax therapy is used, and under these circumstances the functional impairment of the healthy pulmonary tissue is not great, nor is the procedure very dangerous. Such cases as a rule do well, and it is perhaps in these cases and with this method that the above-mentioned ideal is most closely approached.

When bilateral artificial pneumothorax is employed, both the functional impairment of healthy lung tissue and the factor of danger to the patient are increased, while the usefulness of the procedure is probably entirely dependent on the production of selective collapse of the diseased areas of the lungs. However, both in unilateral and bilateral artificial pneumothorax therapy adhesions between the visceral and parietal pleuræ all too frequently prevent the attainment of selective collapse, and their division, if that is possible, adds considerably to the risk incurred by the patient.

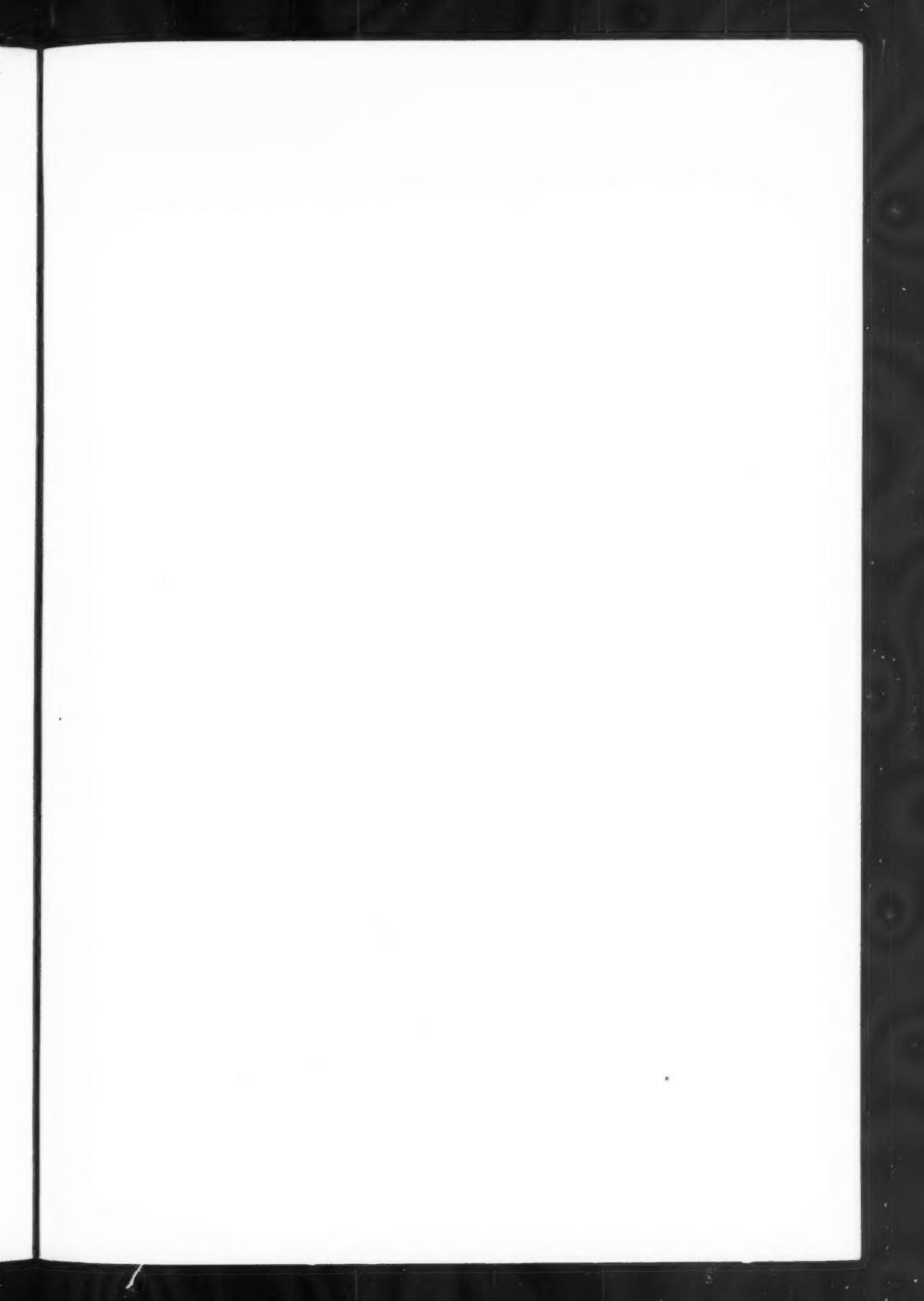


PLATE II

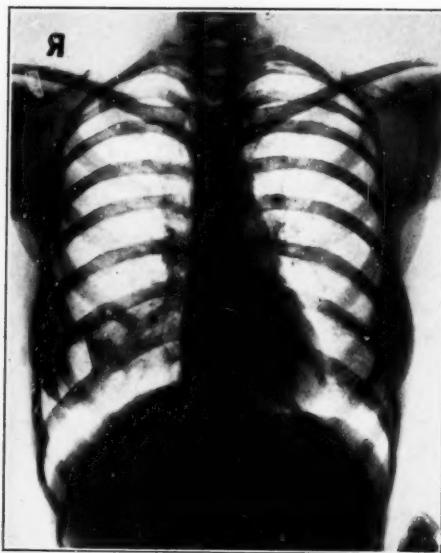


FIG. 1.

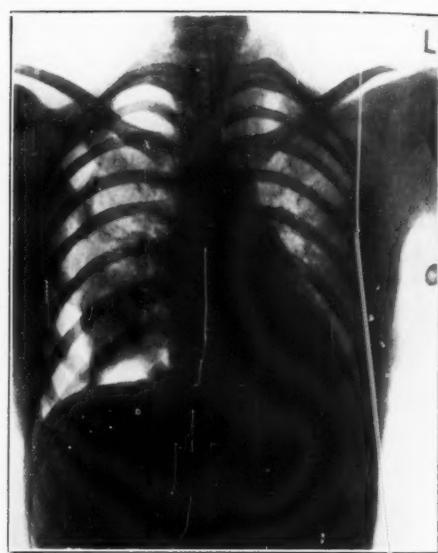


FIG. 2.

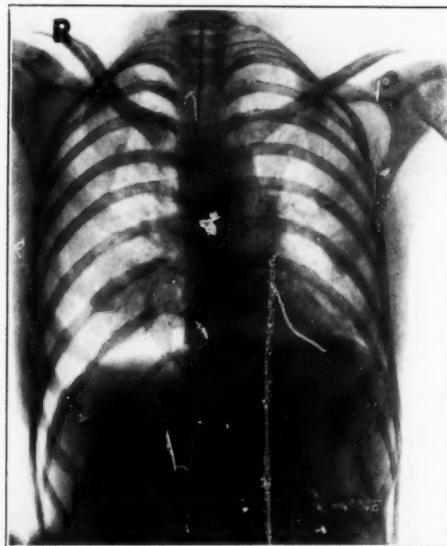


FIG. 3.

from the therapeutic procedure. It must be emphasised, furthermore, that even in the absence of adhesions selective collapse of the diseased areas often does not occur, for its production or development by artificial pneumothorax is not within the control of the clinician.

It would seem highly probable, therefore, that if an ancillary method could be devised whereby selective collapse in artificial pneumothorax therapy could be brought within the direct control of the clinician without adding sensibly to the risk incurred by the patient, a definite advance might be made in the treatment of pulmonary tuberculosis. It is our purpose in this paper to present a preliminary account of the first of a series of cases in which an attempt has been made to produce and maintain selective collapse during the course of artificial pneumothorax therapy.

Case Report.

Miss R. W., a laundry packer, aged twenty-one, attended Dr. Clifford Hoyle's Out-Patient Department at the Brompton Hospital on August 10, 1937.

She complained that during the last two months she had lost nearly 12 pounds in weight. Other symptoms included lassitude, anorexia, and a relatively unproductive cough of about a month's duration.

Previously she had had no serious illness. Of her relatives, her father was known to have had a "chronic cough" for years, and this later was proved to be due to advanced chronic pulmonary tuberculosis.

Examination revealed a thin, undernourished female whose general condition was poor. Physical signs in the chest were few. They included tachycardia, and in an area near the angle of the right scapula the note to percussion was impaired, and expiration was prolonged. There were no adventitious sounds, and examination of other systems revealed no abnormality.

Radiological examination showed an area of infiltration with excavation near the apex of the right lower lobe. With Dr. Hoyle's kind permission she was admitted to St. Mary's Hospital under the care of the author on August 13, 1937.

There the clinical condition was found to be essentially similar. Sputum contained numerous tubercle bacilli. Her temperature was found to vary between 97° F. in the morning and 99.8° F. in the evening while on absolute rest. Her weight was 6 stone 2 pounds, and the erythrocyte sedimentation rate (Westergren) was $\frac{37}{200}$ mm. in one hour.

A right artificial pneumothorax was induced without difficulty on August 17, 1937, and was maintained with adequately spaced refills until

her transfer from hospital to sanatorium nine weeks later. On August 24 1937, at 9.30 a.m. an X-ray of the chest was taken, and the appearances are shown in Fig. 1. At 11 a.m. she was given $\frac{1}{4}$ grain morphia and $\frac{1}{100}$ grain atropin. Her throat and larynx were sprayed with 5 per cent. cocaine and she was taken to the theatre. There, 6 c.c. of evipan were given intravenously. Bronchoscopy was then performed by Mr. F. J. Simpson. An instrument consisting of a ureteric catheter fitted at its distal end with a thin-walled rubber balloon, watertight and capable of inflation, and at its proximal end with a watertight metal adapter and tap was passed under direct vision through the bronchoscope into the right lower lobe bronchus. The balloon was then inflated with 4 c.c. of distilled water from a Record syringe and the tap was closed. Gentle traction sufficed to show that the balloon was firmly held in the bronchus, which was therefore efficiently occluded. The bronchoscope was then removed, leaving the catheter and balloon *in situ*. The proximal end of the catheter with its adapter and tap was strapped to the patient's cheek, and she was transferred to the X-ray department.

She was screened, and radiograms of the chest were obtained at hourly intervals for the next six hours, by the end of which massive selective collapse of the right lower lobe was shown to be present. During the first four hours of this period she slept quietly, while in the last two hours she was awake and not unduly disturbed by the presence of the catheter, which was still firmly in position. The tap of the instrument was then opened, the water allowed to escape, and the instrument was removed. The patient was then returned to the ward. The progress of the selective collapse may be followed in Figs. 2, 3, 4, and 5, the last of which was taken immediately after the withdrawal of the catheter and balloon. It will be seen that as the lower lobe shrank in size the upper lobe expanded, and this in our opinion accounts in part for the fact that the intrapleural pressure readings before and at the end of the procedure varied little. They were respectively, -1-3, and -9-5 cms. H_2O with "tidal" respiration. No refill was given during the procedure and it was not considered necessary to alter in any way the intervals at which the refills of the pneumothorax were being performed. It will be noticed, furthermore, that apparently complete obliteration of the cavity occurred, in spite of the presence of two previously unsuspected pleural adhesions.

The procedure did not cause any objectionable reaction. Neither temperature, nor pulse, nor respiration was increased. The larynx remained normal. No fluid reaction occurred. The physical signs remained unaltered. The sedimentation rate during the remaining two months of her stay in hospital varied as follows:

PLATE III

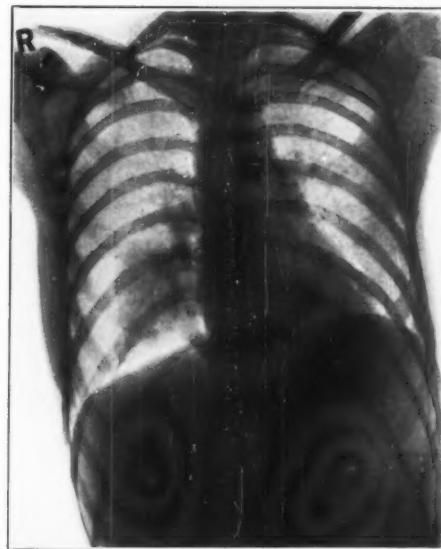


FIG. 4.

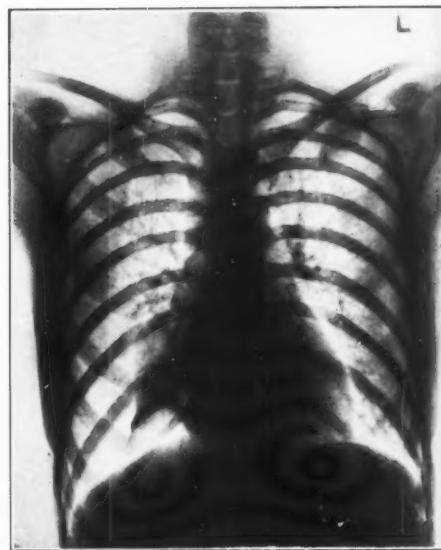
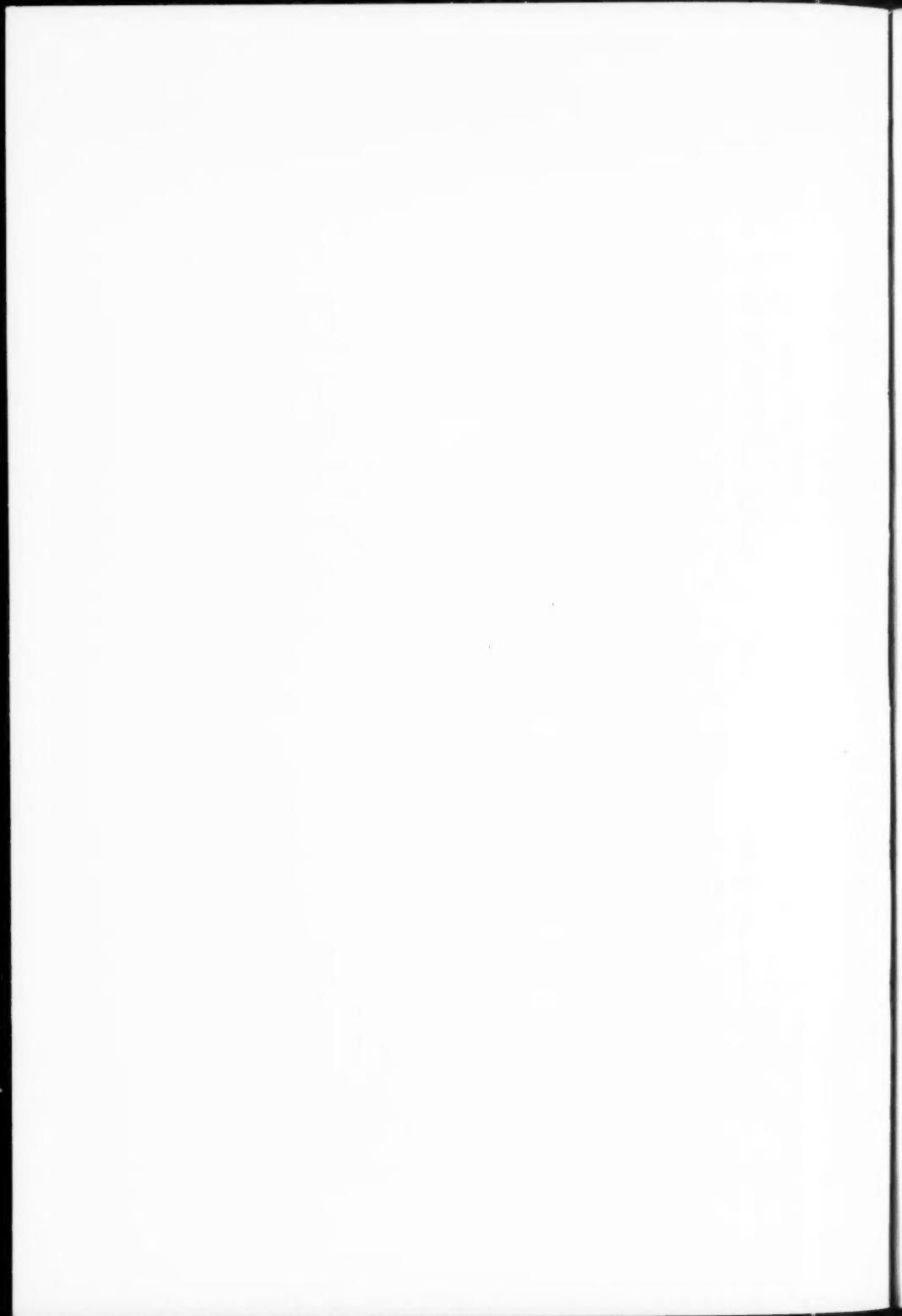


FIG. 5.

[To follow Plate II.]



25. 8.37: 15/200 mm. in one hour.

30. 8.37: 10/200 " "

11. 9.37: 12/200 " "

12. 10.37: 8/200 " "

Her weight increased steadily from 6 stone 2 pounds on admission to 6 stone 9 pounds on the day of her discharge, at which time she was up and about the ward for six hours. She was apyrexial during the last three weeks of her stay in hospital, and the cough had entirely disappeared.

Radiological control of the condition of the lungs was obtained at weekly intervals during the first month, and at fortnightly intervals thereafter. Complete selective massive collapse of the right lower lobe was shown to be maintained, and there was no evidence of further infiltration in the healthy pulmonary tissue.

Details of the pneumothorax refills are appended below, and show that at no time were the volumes of air admitted or the pressures within the pleural cavity excessive.

17. 8.37: Induction R.A.P.

- 17 - 10 250 c.c. - 10 - 6

18. 8.37: - 10 - 5 350 " - 6 - 2

20. 8.37: - 12 - 4 350 " - 6 - 2

23. 8.37: - 12 - 6 400 " - 6 - 2

24. 8.37: Right lower lobe bronchus blocked for six hours.

27. 8.37: - 10 - 4 450 c.c. - 5 ± 0

1. 9.37: - 10 - 3 450 " - 5 ± 0

7. 9.37: - 9 - 3 450 " - 5 ± 0

14. 9.37: - 9 - 3 400 " - 5 ± 0

22. 9.37: - 8 - 2 400 " - 4 ± 0

30. 9.37: - 10 - 2 400 " - 3 + 2

9. 10.37: - 8 - 2 400 " - 2 + 2

16. 10.37: - 8 - 2 450 " - 3 + 2

22. 10.37: - 6 - 1 450 " - 2 + 2

Discussion.

The occurrence of massive collapse of the lung in the course of chronic pulmonary tuberculosis has long been recognised as a comparatively rare complication, following, for example, severe haemoptysis. Recent work, particularly in America, has made it seem probable that this complication occurs much more frequently than was formerly believed to be the case. From a clinical point of view it is especially noteworthy that those cases in which this accident happens show little tendency to activity in the tuberculous process, and as a rule follow an exceedingly chronic course,

which contrasts strikingly with the apparently gross physical and radiological changes evident in the lung.

This clinical observation is in accordance with the recent experimental and clinical work of Adams and Singer,¹ Coryllos² and others. However, particularly in America and on the Continent, massive collapse of the lung and bronchial dilatation within the collapsed area have been recognised as consecutive phenomena for more than a decade. So frequent is this association that many authors, including Erb,³ Rist, Jacob and Trocme,⁴ Coryllos,² and more recently in this country Jennings⁵ and Davidson and Lee Lander,⁶ have suggested that a causal relationship exists between the two.

The possibility of the production of bronchiectasis by the above-mentioned procedure therefore arises. However, massive collapse of the lung has happened incidentally during the course of artificial pneumothorax therapy sufficiently frequently in the past that, if bronchiectasis invariably followed its occurrence under these circumstances, it is inconceivable that it would have passed clinically unrecognised in all these cases when the lung was allowed to re-expand. Moreover, on theoretical grounds its production is unlikely in the extreme, for the great negative pressure which obtains when massive collapse occurs in the absence of a pneumothorax, and which is immediately concerned with the production of bronchial dilatation, cannot develop when artificial pneumothorax is present.

The fact that, in the case described, the bronchus was completely occluded for approximately six hours before complete collapse had occurred is of extreme interest in view of the unknown aetiology of massive collapse. It would seem possible, for example, that factors other than bronchial occlusion are operative in the rapid massive collapse which follows trauma.

Whether a selectively collapsed lobe will ever re-expand when the pneumothorax is finally abandoned will presumably depend on the extent of the fibrotic change which may have occurred within it, and that in turn will presumably largely depend on the severity of the local tuberculous lesion. It may well be found that those lobes which do not of their own accord re-expand with the rest of the lung are best left permanently collapsed. Should re-expansion of a collapsed lobe occur before it is deemed wise to abandon the artificial pneumothorax, there would at present seem to be no reason why the above procedure should not be repeated.

This ancillary method of treatment in pulmonary tuberculosis has been applied to other cases. The original instrument has been modified, so that it is now possible to produce selective collapse of the upper lobes, and in the case of lower lobe disease greatly to reduce the period of time during which bronchial occlusion must be maintained in order to produce selective

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collapse. It is hoped in the not distant future to present the results of the method in an adequate series of cases from which its limitations and value may be judged.

Acknowledgment.

Our grateful thanks are due to Dr. Clifford Hoyle and to Mr. J. F. Simpson for their kindly help and encouragement. We are also deeply indebted to the Genito-Urinary Company of London for their invaluable advice and enthusiastic co-operation.

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TRAUMA AS A FACTOR IN PULMONARY TUBERCULOSIS

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ENVIRONMENTAL factors often produce a profound causal relationship in the development of pulmonary tuberculosis. Among one of these factors, trauma assumes a responsible element in the activation and progress of this disease. Trauma may be evidenced by various types of injuries, such as mechanical, produced by a force to the body or chest; chemical, resulting from inhalation of injurious gases and fumes; and thermic, exposure to injurious weather conditions.

The following case is presented to illustrate the definite rôle trauma assumes in the precipitation and development of pulmonary tuberculosis.

CASE REPORT.

H. E., white, male, age thirty-four, a fireman by occupation.

Present Illness.—The patient states that he was in apparent perfect health up to the time of an industrial accident on November 16, 1933, when he was engaged in fighting a fire in the rear end of a residence. During the

approximate hour and a half on duty he was exposed to adverse conditions of physical fatigue and exhaustion, and water drenching of his bare head and clothing. Upon emerging in this condition to the outside the sudden exposure to the cold atmosphere quickly froze his water-soaked clothes to his body, chilling him thoroughly. Upon his return to the fire station he was so completely frozen that it was necessary for him to be thawed out, following which he continued his duty in the fire station. On the following day he complained of malaise, weakness, aches and joint pains, difficulty in hearing, chills and fever. In addition he experienced a disturbance of his senses of taste and smell. While remaining on duty in this weakened physical condition his symptoms became more pronounced and aggravated, and so after two weeks he consulted the department physician, who advised the patient to continue on duty without ordering any specific treatment. He remained on duty throughout winter and spring, during which time his physical condition failed to improve. His symptoms, in addition to his general malaise and daily fever, consisted of hoarseness, cough, and dryness in the throat. In mid-June he consulted private physicians for the most aggravating complaints of throat irritation. Medical investigations led to a detailed study of his larynx and lungs, with the aid of X-rays and sputum examinations. The results of these findings revealed the presence of pulmonary and laryngeal tuberculosis. On August 5, 1934, the patient was taken off duty, and three days later he was ordered by medical attendants to immediate bed rest, which was to continue for the following eight months. Following this confinement in bed the patient became ambulatory, with regular special treatments, which are still continued at this time.

Personal History.—The patient was born on January 7, 1903. He had smallpox and mumps at the age of seven years. His tonsils were removed at the age of eighteen years, and his appendix in the following year. He had no history of tuberculosis, and no known exposure to it. He was married at the age of twenty-one years, and does not have any children. The patient entered the fire department at the age of twenty-seven years on October 1, 1930. He was temporarily laid off in March, 1932, because of an oversupply of men. He worked at irregular periods at Ford's factory from July, 1932, to September, 1932. He was readmitted, after necessary medical examinations, to the fire department in January, 1933, and remained at work until his dismissal on August 5, 1934.

Family History.—The patient's father is sixty-four years old, enjoying good health, and his mother is sixty-seven years old, also enjoying good health. He does not have any brothers or sisters. There is no history of tuberculosis in his family. His wife, with whom he has lived continuously for the last twelve years, does not have any history of tuberculosis, and a very recent X-ray examination shows no evidence of it.

X-ray Examination.—The conclusions of the lung findings on July 30, 1934, showed the following: "Extensive bilateral parenchymal lesions of the exudative type in both apices, with paratrunkal fibrosis and some early excavation in the upper left lung."

Laboratory Test.—The sputum was found to contain tubercle bacilli.

Discussion.

The case of this patient presents an individual who was in apparent perfect health previous to an injury, as evidenced by his personal history, family history, and occupational records. While working under extreme conditions of exposure the patient suffered in this injury a sudden and marked lowering of his physical resistance, which predisposed and precipitated the progression of his pulmonary tuberculosis by activating apparently dormant tubercle bacilli. Although the symptoms of this disease were apparently present earlier, his condition was not diagnosed as tuberculosis until approximately eight months following his injury.

Medical authorities substantiate the opinion that external factors frequently bear an important causal relationship in the activation of dormant tubercle bacilli into the disease of tuberculosis.

*Krause*⁵ states that the influence of environmental factors on tuberculosis in the individual is plain and definite. He shows that it is not an uncommon experience to find the first symptoms of the disease develop after the more or less complete recovery from other infections, such as chest colds, bronchitis, sinusitis, influenza, pneumonia, etc. He sums up, stating that in brief and in general one may regard as a potential aetiological force in tuberculosis any and every environmental influence that has in it the capacity to activate infection already present, in which the activating agent accomplishes this effect through putting the body under physiologic strain. Thus the combination of all factors is always modifiable for better or worse by environment, which is the really decisive force in the aetiology of tuberculosis.

*Grave*¹ holds the opinion that an individual in good health would be more likely to develop tuberculosis, and the tuberculosis would be more likely to become active if one's vitality were lowered either by an injury or disease. Inasmuch as all human beings are susceptible to tuberculosis, this disease is found where an opportunity for infection is present.

*Hope*³ states that almost any condition which lowers the resistance of the body to disease may predispose to tuberculosis. He shows that tuberculosis is still so widespread among mankind that, given the necessary predisposing causes in a community, its ravages will become apparent with an all but mathematical certitude. Tuberculosis depends on two factors: the factor of infection of the tubercle bacillus as the seed, and the factor of predisposing causes as the soil. Among some of the predisposing causes of tuberculosis are excessive fatigue, dissipation, excessive heat and cold.

*Norris*⁷ shows that as a result of some acute disease the individual may

be rendered more susceptible to reinfection of tuberculosis, or as the result of lowered resistance a quiescent tuberculous lesion may become more active.

*Mock*⁶ reiterates that, besides the presence of the tubercle bacilli, trauma and occupational hazards form an important part of the predisposing aetiological factors in the development of tuberculosis.

*Kessler*⁴ states that it is generally known that practically all mankind is infected with tuberculosis, in which only a small percentage suffer from the active disease. The disease does not get hold upon the patient unless the resistance is lowered to allow a sudden activation of a possible pre-existing focus within the body. The causes of lowering resistance, such as over-exertion, fatigue, and exposure to extremes of heat, cold and humidity, are common factors in predisposing to tuberculosis.

*Hawes*² shows that tuberculosis as an industrial accident must be admitted. He reported thirty-nine cases in which tuberculosis of the lungs was caused by personal injuries, and for which compensation was granted. He defines personal injury as any injury or disease arising not only in, but also from, the course of employment, which includes, besides trauma, infectious diseases as pneumonia, bronchitis, upper respiratory diseases and others, if these arise out of employment.

*Shipman*⁸ states that industrial hazards are a predisposing cause in the development of tuberculosis. He writes that no one will deny that tuberculosis does at times arise out of and during employment. Tuberculosis is shown to be developed or activated as a result of an industrial disease or disease related to a personal injury.

*Mayer*⁹ emphasises the rôle of thermic trauma in predisposing to pulmonary tuberculosis. He shows that exposure to cold may act as a trauma leading to the development of this disease. Cases are on record where undue exposure to extreme cold and wet have led to such developments. Workers who were accidentally thrown into icy waters and soldiers exposed to cold and wet in the trenches have subsequently developed manifestations of pulmonary tuberculosis. He shows that chilling is also a likely factor in reactivating pre-existing latent tuberculosis into active form. Chilling may provoke respiratory symptoms resembling the common cold or grippe, and these may often be manifestations of early tuberculosis. Thus thermic trauma may bring about tuberculosis by acting as an exciting cause. A case is cited in which a stevedore, aged forty-five years, slipped and fell into the San Francisco Bay in the course of his employment. He was thoroughly soaked and chilled. The following day he became ill with a very severe upper respiratory infection. After apparently convalescing from the effects of this sudden exposure he continued to have

symptoms of a respiratory nature, along with some continual fever. X-ray of the lungs and sputum examination revealed the diagnosis of pulmonary tuberculosis. In reviewing the facts it was held that, inasmuch as the man had previously been perfectly healthy, as far as available evidence showed, the accident of exposure, with its subsequent infection of the chest, had been the predisposing cause for the development of his tuberculosis.

Summary.

1. Trauma plays a definite rôle in the precipitation and progression of pulmonary tuberculosis.
2. Trauma may continue to exert its deleterious effect on an individual even after more or less complete recovery from the initial symptoms it had produced.
3. The influence of trauma causes a lowering of resistance of the body and thus predisposes for the development of tuberculosis.
4. Since tuberculosis is a disease to which all human beings are susceptible, the disease may light up at any time under the influence of trauma.

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ON SWALLOWING THE SPUTUM

By C. G. LEAROYD,
M.R.C.P., L.R.C.P.

THE late Dr. Meek, of Frimley, had a story of a patient of his, a bus-conductor, who, carefully trained at sanatorium to mug and flask, found sanitary expectoration a matter of embarrassment in following his profession. He took his difficulties to his old doctor in Balham, whose crisp advice was: "Swallow it, man; swallow it."

Is this advice sound or not?

The Vic-Edwardian school, flushed with the Pasteur-Listerian successes of finding, identifying, and sometimes defeating a number of micro-organisms, will shudder at the thought of giving them another chance on the bowel wall. To them one would say: "Go and take off a month-old elasto-plast bandage from a foul varicose ulcer, and then deny that there may be merit in stewing in one's own juices." Besides is there any evidence that those tubercular persons who habitually swallow their sputum—many normal phthisical cases and most of the phthisical insane—do, in fact, suffer from abdominal tuberculosis more than the well-trained patient who is careful not to do so? If there is any increased incidence it must be very small indeed.

Then one has heard the objection that it is a "revolting practice." This surely is an unscientific, almost a provincial argument, although the psychology of it is interesting. Every natural being loathes the excretions of another—except a mother her child's. But he does not loathe his own excretions. On going round the wards, does not one note with what interest, intimacy, almost affection, the patient will regard the contents of his mug? The doctor who used the adjective "revolting" was thinking in terms of another's sputum.

After all, this is a simple natural history problem and should be approached as such.

Let us begin with the frequently observed fact that the unrecognised and untutored case of phthisis will swallow all his sputum until it begins to make him feel sick, then he will spit it out. One very much doubts whether primitive man ever had the habit of spitting. Why should he waste a valuable lubricant, rich in protein, and leave a means of being tracked

by his enemies? That is why children can rarely be induced to spit; in this, as in so much else, they mirror the early state of man, just as the foetus mirrors the earlier stages of his evolution. One can say, then, that the normal instinct of man in health is not to spit, except as a reflex to foreign bodies.

Now let us briefly survey the relationship of man with his bacterial enemies from the beginning. Let us, as it were from the pavilion, god-like regard this ancient contest of Man *v.* Some of the Schizomycetes, focusing our attention particularly on the fight with the tubercle bacillus. Let us go back to the time when it was non-pathogenic. In those early days, when every alveolus was a wide open space which expelled its contents in a third of the time it took to be filled, when the ciliated epithelium worked with a swish, and when men were men, the modern mode of entry was denied to it. The gastric route, too, was barred by an acidity probably higher than a modern dog's. It had to content itself in spinning "fairy rings" in some dead animal material, or possibly as a skin fungus like Pityriasis or the Smegma bacillus. Its first attack on the lungs was most likely accidental. An arrow carried a colony into the tissues. In this way it would originally be like the peace-loving tetanus bacillus, which only takes to homicide when pushed into the job on the end of a pitchfork.

Behold, then, the Father of all Consumptives, lying in some tertian forest, suffering from a small penetrating wound of the chest. The wound heals, but the tubercle colony remains behind in the parenchyma of the lung. For some reason they not only found the new habitat immensely to their liking, but it vastly increased their virility. The same thing happened to the brown trout and the blackberry when introduced into New Zealand.

The "fairy rings"—the habit of killing in the centre as the colony expands—became cavities.

In this way the tubercle bacillus was a "freak" or "sport," and transmitted its newly acquired characteristics to succeeding generations, just as the Lombardy poplar has done.

Our first case—Foac, let us call him—would live for a number of years after his inoculation. He would swallow all his sputum, except when he was actually dying and was too weak to do so. He probably infected his tribe by faecal spread and spray infection. Possibly the tribe was on the run then and was lurking in caves, and the vitiated atmosphere poisoned the ciliated epithelium and made infection by the bronchi possible. The tubercle bacillus then, as now, loved to be an ally of other disasters rather than work alone. It wouldn't be a very virulent disease at first, but it would grow in virulence crescendo. Foac's great-grandchildren would be dying in a week or so, the tubercle bacillus having developed the *coup*

d'état method of the modern pneumococcus, an entire lobe being seized almost overnight. Looked at in this way, a case of tuberculous pneumonia may be regarded as a reversion to a prehistoric mode of attack, although it is still the usual form in virgin soil on some of the Pacific Islands. For a long time, then, centuries or millennia, it was a rapidly fatal disease, and, because of that, epidemic in character. Incidentally it may be surmised that if man is ever successful in partially eliminating the tubercle bacillus from his species, then, after a generation or two of comparative freedom from the disease, it will come back in this lethal form.

But if it was fatal to man, it was also fatal to the bacillus. Death came so quickly to the host that there was no time for him to form a bacillus laden sputum, to dry up, and be inhaled, and carry on the glorious tradition. Zeal had outrun discretion. Pass on a few thousand years, and out of this welter of conflict, what will be the necessary characteristics of the bacillus that is going to prevail? Obviously there are two. It must be able to secrete a substance that will make its host spit, and thereby secure its own propagation. That is number one. Secondly, it must be able to curtail its own virulence, or, put in other words, it must be able to give its host some immunity against itself.

That it has been successful in both these respects the ubiquitousness of the disease and its altered character demonstrate.

The fungus has made some sort of accommodation with man, an agreement, as it were, to confine itself to trench warfare.

Dealing with the question of spitting first, is it fantastic to suppose that the nausea of tuberculosis, inducing man to void his sputum, is a reaction of the host to a product of the bacillus, which has been acquired through a process of natural selection?

And if this sounds reasonable, then we may enquire how is this nausea produced. We know that it can be produced, and is commonly produced, by the swallowing of sputum, although it sometimes takes a large quantity. That nausea also occurs in "pretuberculous" conditions when there is no sputum does not vitiate the idea, but suggests that the mechanism acts in more than one way.

This, then, may be regarded as the tubercle bacilli's side of the bargain.

What of the man's? Those who scoff at the idea of immunity acquired through the alimentary tract should remember two relevant facts: that infantile immunity to certain diseases is conveyed by the colostrum and that typhoid vaccine taken by mouth is effective.

But is there any evidence that immunity to tuberculosis is obtained by swallowing the sputum? Personally I think very definitely that there is a partial immunity of the day-to-day type conveyed in this way. It is

obviously not the only, possibly not the chief, way by which an immunity is obtained. Quite likely it is an old method that is being replaced owing to the lesser activity of modern man's alimentary processes.

Here are a few observations, extending over twenty years, which have helped to lead to this belief:

1. A considerable number of sixty- to seventy-year-old phthisical patients who have been habitual sputum swallowers.

2. A number of long-standing cases who have been found out by accident, not because they were ill. They have been sent to hospitals or sanatoria, and promptly became ill. Psychological upset? Or were they missing their daily ration of sputum?

3. A number of "rebel" cases who got tired of treatment and have gone back to normal life to "forget about it." Some have done amazingly well, others not nearly so badly as one would have expected.

4. Some cases who had obviously had the disease for a long time, whose first breakdown was preceded by a gastric upset unconnected with tubercle, such as the eating of bad fish or unripe fruit. The immunity balance upset?

5. The good prognostic significance of repeated gastric hyperacidity. This may be no more than saying that a patient with a good digestion is well armed in fighting a wasting disease like phthisis. But perhaps that's how it works.

6. Above all, the shorter period of illness in an ordinary exacerbation of a chronic case in a sputum swallower, suggesting that the sequence may be activity, more sputum, more swallowed, more immunity, less activity.

None of these is convincing in itself, but taken together they are suggestive, possibly not so much to the doctor as the field naturalist.

Be this as it may, still one doubts whether the old Balham doctor took all these matters into consideration. He had probably observed in the course of a long life in practice that the swallowing of sputum does very little harm, and—nobody can deny this—for the phthisical patient it is at times extremely convenient.

CONSULTATION

CASE

By GEOFFREY TODD,

M.R.C.P. (LOND.),

Medical Superintendent King Edward VII. Sanatorium, Midhurst.

THE patient, a man of twenty-seven, developed a right-sided pleurisy in March, 1934. The temperature was raised and began to swing between 101.8° and 100°. Effusion developed and the temperature persisted for some eight weeks. A sample of the fluid was taken and found to be clear and contained a predominance of lymphocytes. No tubercle bacilli were found either on culture or guinea-pig inoculation.

As the temperature showed no signs of settling after fourteen weeks, 15 ounces of the effusion were aspirated. After this the patient brought up a little sputum which was found to contain tubercle bacilli. It was decided to perform gas replacement, and in July, 1934, the effusion was completely aspirated and 800 c.c. of air introduced.

The temperature gradually fell and the patient began to get about, and in October he was free from cough and expectoration, but the effusion had reaccumulated, so that three further aspirations had been necessary. After a winter in Switzerland the condition of the patient was extremely good, he was free from symptoms, but he had a right hydrothorax.

He returned to his work, which was a sedentary occupation in London, and kept fit during 1935 and 1936, but had fluid replacement performed about once every eight to ten weeks. In May, 1937, he asked whether anything could be done to prevent these repeated aspirations and the reaccumulation of effusion. He was free from symptoms, except slight dyspnoea on exertion, and had been at work since his return from Switzerland, and said he felt well in himself. The effusion is now a cloudy yellow, contains tubercle bacilli but no other organisms.

The point of this consultation is to consider the present position, and discuss prognosis and alternative methods of treatment.

It is quite obvious, from the long history and the number of times the fluid has returned, that if the patient is allowed to continue in his present

state his general health will slowly deteriorate and he will also run the danger of his fluid slowly becoming thick pus and eventually causing sinuses in his side from needle punctures, and perhaps even amyloid disease.

What courses of treatment are open? Gas replacement has proved useless, as his pleura is so infected with tubercles that re-formation of fluid is a certainty in a few weeks after aspiration.

The whole problem is to rid the right pleura of its pyopneumothorax. What are the ways at our disposal?

(1) By giving pleural wash-outs at regular intervals, and by leaving as negative a pressure as possible at the conclusion of each, hope to induce the lung to re-expand and obliterate the space.

(2) By giving pleural wash-outs to disinfect the pleura, followed by complete thoracoplasty.

(3) Thoracoplasty at once, after removal of fluid.

Let us consider each of the above in a little more detail.

1. Pleural Wash-outs.

The patient should be admitted to an institution and the wash-outs commenced with normal saline. The two-needle method is to be preferred, as it is quite safe and the pressure of air above the fluid can be regulated during the whole procedure. Two pints of saline should be run in during the wash-out in whatever quantities the pleural space can tolerate. At the end the pleural cavity must be left dry and with as great a negative pressure as the patient can stand. After the first wash-out, a careful check should be kept on the temperature. If no undue reaction takes place (as it should not in a case of as long standing as this), a further wash-out with the same material should be done in one week's time. Saline should give place to eusol or Dakin's solution after about the fourth treatment, as this appears to have more effect in softening the thickened pleura over the lung and thus promotes re-expansion. The patient should be screened after each treatment in order to see if the lung shows signs of expansion. If there is no sign of expansion after two months, however, one may safely say wash-outs alone will not cause re-expansion of the lung and obliteration of the space. If, on the other hand, the lung does commence to re-expand, wash-outs should be carried on for at least six, or even twelve, months longer.

2. Pleural Wash-outs followed by Thoracoplasty.

The wash-outs are performed as already described, and after three or four months, when the fluid shows signs of becoming thinner or drying up to some extent, thoracoplasty should be performed. As it is essential

to remove as much rib as possible, the operation should be done in three stages. Aspiration of any accumulation of fluid should be done just prior to each stage. After completion of the thoracoplasty it is essential to carry on the wash-outs in the now extremely restricted space until the lung re-expands the small amount and obliterates the residual space. This sometimes takes three to six months after the thoracoplasty, but may be of much shorter duration.

3. Immediate Thoracoplasty.

This is quite often done, but is not, in my opinion, the favourable treatment. The patient is generally left with a residual space in which the fluid accumulates for months afterwards, the reason being that the thickened pleura has not had any chance of becoming thinned down by irrigation or similar procedure.

Just lately I have seen three cases of tuberculous hydropneumothorax clear up their fluid after three months of pleural wash-outs, and they are now treated as ordinary artificial pneumothorax cases. This case I do not consider, owing to its long history, could hope for that result.

Conclusions.

Taking all things into account, I would advise entry into a sanatorium, a course of pleural wash-outs controlled by screening, and thorough bacteriological examinations of the fluid, followed by a complete thoracoplasty and wash-outs afterwards until the residual space closed.

The prognosis of tuberculous hydropneumothorax used to be considered very grave, but since the introduction of pleural irrigation followed by thoracoplasty a great number of these cases recover and resume their usual occupations. I consider the outlook in this particular case quite good, and if all went well I think he could be told he would be back at work in nine to twelve months' time. Some may say this is a long time to give up when one is apparently quite well physically and able to carry on, but when the risks of an untreated tuberculous hydropneumothorax are considered, twelve months is a short time to give to its eradication.

CLINICAL CASE

RECOVERY FROM EMPYEMA WITHOUT OPERATION

By L. S. T. BURRELL,

M.D., F.R.C.P.,

Physician to the Royal Free Hospital and to the Brompton Hospital for Consumption and Diseases of the Chest.

A SCHOOLBOY of sixteen complained of pain in the back on June 13, but not sufficiently severe to prevent him from rowing. In the evening his temperature was 102° F. and pulse 100 and he was sent to bed. The next day he felt quite well and wanted to get up, but the temperature was 101° F. There were no physical signs. On June 15 his temperature was 105° F., pulse 100 and bounding in character. There was no cough or other symptom, but breath sounds were weak at the left base. The skin was hot and dry and he felt feverish; white cell count, 12,800. On the 18th there was tenderness and impairment on percussion at the left base, but no adventitious sounds and the breath sounds were weak. Temperature had been gradually falling for the last two days and was now 99° F., pulse 66. On June 19 X-ray showed an opacity at the left base suggestive of pneumonia and not effusion. The temperature remained at 99° for two days and then began to rise and swing between 101° and 99°.

On June 25 there was dulness at the left base, and a sample of cloudy, slightly purulent yellowish liquid was aspirated. It was sterile, but contained pus cells and a large number of polymorphonuclear cells. No tubercle bacilli were found. A blood count at this time showed a leucocytosis of 26,400.

It was thought that the pus would thicken and need drainage in a week or ten days, but although the evening temperature was between 99° and 100° for another month, the condition finally resolved without operation or further aspiration. In August X-ray showed irregular movement of the left dome of the diaphragm and slight thickening of the pleura at the

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left base, but no involvement of lung tissue on either side and no evidence of any tuberculous lesion. He made a slow but uninterrupted recovery.

The unusual features in this case are the entire absence of cough or sputum throughout the illness, the facts that the pulse never exceeded 100 even when the temperature was 105° F., and that the empyema absorbed naturally. It is not uncommon to find associated with pneumonia a clear effusion which absorbs after one or more aspirations or even without aspiration. Such cases are especially seen during an influenza epidemic, and the effusion may develop after what seems to be a case of simple influenza without any evidence of pneumonia.

In this case, however, the fall of temperature by lysis suggested resolution of the pneumonia, and when it began to rise again, a sample of slightly purulent effusion was found, and the leucocyte count went up to 26,400, the ultimate need for operation seemed almost inevitable.

I have seen one case of bilateral broncho-pneumonia with influenza in which a large effusion formed on both sides. Both were aspirated on several occasions, and after three aspirations the left effusion cleared up, but the right one went on to frank pus for which rib resection and drainage were performed and the patient made a good recovery.

MEETINGS OF SOCIETIES

THE TUBERCULOSIS ASSOCIATION

EIGHTY-FOUR members of the Association visited Paris from October 14 to 16. After a brief visit to the hotel the party went to the Cité Universitaire in the Boulevard Jourdan, where they were received by the Comité National de Defense contre la Tuberculose, of which Professor Besançon is Chairman. An excellent tea was provided in one of the beautiful rooms of the building. A tour of the university was made, and one felt how lucky the 3,000 students were to have such a spacious and modern hostel. After tea short speeches were made by Professor Besançon ; Dr. Pelissier, chief officer of the School of Medicine ; M. Courbet, Rector of the University; and Dr. Le Clainche, chief Medical Officer of Public Health.

In the evening the members of the Association were entertained to dinner in the Museum of Modern Art, a magnificent building recently erected as part of the exhibition and one that is to remain permanently. M. Ducart, Minister of Health, spoke after dinner and welcomed the Association. He referred to the great work of Sir Robert Philip, who started the dispensary system, now as well established in France as in this country. He also commented on the recent great progress made by English surgeons in thoracic surgery.

Professor Besançon said that although he hoped the Association would see the medical work being done, he would point out that there is a lighter side to Paris and a great exhibition to visit, and that work and pleasure should be blended.

The Commissaire Général of the museum also spoke, and replies were made by Dr. L. S. T. Burrell and Sir St. Clair Thomson. After leaving the dining hall a tour of the pictures and tapestries of the museum was made and the party had the advantage of this private visit to the priceless treasures of the museum.

Late to bed but early to rise, for 9 o'clock on the next (Friday) morning found the Association at the Laennec Hospital. Here Professor Besançon came himself to demonstrate and show the party the work of the hospital, which is the chief one for the Paris Tuberculosis Service.

Some of the party then went to the surgical department, where Drs. Maurer and Monod showed slides of thoracoplasties, and water colours of adhesions as seen through the thoracoscope were shown by Dr. Meyer. Dr. Maingot demonstrated the tomograph and a method of diagnosing tuberculous enteritis by radiography after an enema of colloidal thorium.

The other members of the party went to the Pasteur Institute, round which they were conducted by Dr. Guérin. This world-famed institute is associated with the names of great men. Within the building is the beautiful tomb of Pasteur himself, and in the grounds is the grave in which the famous Dr. Roux rests. In the institute are portraits of distinguished scientists, including Metchnikoff, whose ashes are also there.

Perhaps the best-known work which is now being carried on is the preparation of B.C.G., and it was most interesting to hear Dr. Guérin himself speak of the work. In 1936 210,000 persons were treated with B.C.G. Each phial is carefully numbered and entered in a book, with the name and address of the person to whom it is sent. Every possible precaution is taken so that contamination is impossible.

The two parties then met at the Hôtel de Ville, where they found the ladies of the party already assembled. Here they were received by the President of the Municipal Council of Paris, who welcomed them with a short address in one of the gorgeous rooms of this historic building. After the address the visitors' book was signed and the party passed into another room, where refreshment was served.

The Association then left for Suresnes and had a delightful drive through Paris to this beautiful village on the Seine. Here they were entertained to luncheon by the Mayor of Suresnes and afterwards visited the open-air school. This school is a large modern institution for delicate children. To judge by the laughter and happy faces, the children are not only acquiring health but having a first-rate time. It is fitted with all modern requirements, including shower baths, gymnasiums and open-air classrooms. This school is not intended for the tuberculous, but for the fragile or delicate child. Tuberculosis, even glands of the neck, renders a child ineligible.

On the return journey the professional schools were visited and the party were then entertained to tea in the exhibition. They were also taken for a trip in one of the Seine boats, from which they obtained an excellent view of the exhibition buildings.

On Saturday morning two parties were again formed. One visited the Caisse Interdepartmentale des Assurances Sociales, where M. Marcel Martin, the director, and M. Georges Caher, the head of the medical and social department, showed them round and entertained them to light refreshment. The rest of the party were received by Dr. Weill-Halle and

Mlle. Greiner at the School of Puericulture and shown round this interesting establishment.

The Association and the ladies of the party then met and went to Franconville, some twenty-five miles out of Paris, and were entertained to luncheon at the Sanatorium Saint-Martin du Tebreat by the office of Public Hygiene of the department of the Seine. Dr. Seguy, the Chairman, Dr. Hazeman, Inspector, and Dr. Davranche, Medical Superintendent of the sanatorium, welcomed the party. This sanatorium is a large institution for 540 male patients. Nearly half of them are being treated by some form of collapse treatment and less than 10 per cent. are in bed. Dr. Monod, the consulting surgeon, does the necessary operations, including several cases of extra-pleural pneumothorax.

This visit concluded the business part of the programme, and after luncheon M. Seguy in a brief speech said how glad he was to welcome the English visitors. Dr. Burrell replying said that the thanks of the Association were due to all those who had given them such royal entertainment, as at this luncheon, and wherever they went they found that the heads of the departments had themselves come forward to welcome and entertain the Association instead of delegating the work to their juniors. To Dr. Hazemann special thanks were due for all the arrangements he made, and also to Dr. Godard. Thanks were also due to the Association's secretary, Dr. Heaf, for all the work he had done in collaboration with Drs. Hazemann and Godard. Mrs. Burrell then thanked Mme. Fred Blumribes and the other ladies who had done so much to entertain the ladies of the Association.

After leaving the sanatorium the party returned to Paris, where they were entertained to tea on the Eiffel Tower, which is in the exhibition grounds. After this good-bye to the kindly French friends and with sad hearts but happy memories the party proceeded to the Gare St. Lazare.

There was only one shadow in the meeting, and that was the absence through indisposition (from which he has now happily recovered) of the president, Dr. Roodhouse Gloyne. He kindly sent a telegram of good wishes, but his presence was sadly missed. He has had a report of the meeting, and it is by his request that the writer again emphasises the deep appreciation of the Association for the excellent programme, both medical and social, arranged by its French colleagues. To Dr. Hazemann, who speaks perfect English and who accompanied the party throughout the meeting, the Association tenders its warmest thanks. Dr. Godard also was responsible for a large amount of the work which made the visit so successful. That Dr. Besançon, the busy and great physician, should have given up so much time to showing the party the work done in his own sphere of activity and himself coming round with them on social occasions was deeply appreciated.

It was more than gracious of the President of the Municipal Council of Paris to receive personally the Association at the Hôtel de Ville and for leaders in the Ministry to attend and speak at the dinners. To its French friends the Association says, "Thank you very heartily."

A MEETING of the Association was held at Manson House on Friday, November 19, the President, Dr. S. R. Gloyne, being in the chair. At the first session Mr. Lionel Pearson, F.R.I.B.A., gave an address on "The Construction of the Tuberculosis Sanatorium."

It was difficult, he said, to say anything fresh about sanatorium construction, and he proposed simply to express some personal opinions on a few points. The shape of the sanatorium was now more or less stereotyped, with a long side facing south or south-east; and any variation would be blocks for ambulant or convalescent patients, for whom this aspect was not so essential. Incidentally, this arrangement of wards (corridor planning) had spread to hospitals for the acutely sick, as in one at Strasbourg. The working out of this type of place led, however, to many problems. First, there was the question of balconies. There were several ways of providing these: (a) The glass-roof verandah. These were too hot, and were now out of date. (b) The solid verandah, wide enough back to front to take a patient's bed, and projecting 7, 8 or even 9 feet outside the room. The great objection to this was that it made the room dark, and the speaker could see no practical advantages which could not be better gained in other ways. (c) The narrow balcony, 2 to 3 feet wide, with French windows opening directly on to it. Such a balcony did not overshadow the room; the patient could be wheeled out in suitable weather, but protection was given from driving rain. (d) The so-called "Liegehalle," for which there was no exactly equivalent English term, but architecturally they might be termed "inset balconies." They had no rooms behind them, and architecturally they looked very well. The balconies could be sectioned to prevent undue congregating of patients. A famous sanatorium in Finland was of this type. Lastly, there was a type of which the sanatorium at Passy, Haute Savoie, was an example, in which each room was built with an angle in which the balcony was fitted. This type was ingenious, but costly. English designers were more conservative than their confrères on the Continent. Wards could be planned with one side capable of being completely opened. In King Edward VII. Sanatorium the wards had French windows opening inwards and were provided with jalousie shutters. Other types of window employed were sliding windows in sections, which could be metal or wooden. The difficulty here was to protect from driving rain at night; overhanging eaves might obviate this in some cases. Yet

another type was the disappearing sash window, in which there was nothing to project or catch the wind. The choice of window in this country must obviously take into consideration our climate and the habits of our people. Turning to the question of heating, the speaker said the problem was extraordinarily difficult, and indeed in his opinion had never been completely solved. He gathered that most doctors preferred no heating at all for their bed patients. Discussing radiators *versus* the panel system of heating, Mr. Pearson said the latter cost a little more to instal, but it was definitely cheaper to run. It was hygienically perfect, but it had one or two defects from the patients' point of view. One of these defects was the "time lag," which made it impossible to keep pace with any sudden change of temperature. In a nurses' home he knew of the rooms were warmed by chromium-plated towel rails. In King Edward VII. Sanatorium the floor was heated. This was a sensible and pleasant method, but it was difficult to find a floor material which would stand the heat. The question of noise was an important one, and the speaker drew attention in this connection to a pamphlet issued by the Anti-Noise League, which had some useful suggestions. With regard to plumbing, the ideal was that every patient should have his own basin. Considerations of cost might preclude this, but it was an ideal that should be aimed at in a hospital, and more particularly in a sanatorium. Other amenities, such as rounded corners and flush doors, were now taken for granted today. Single-storied buildings, in his view, led to scattered planning. Tall buildings meant lifts. Most of these questions were largely questions of taste or of economics.

Mr. Pearson concluded by showing a number of slides of sanatoria in this country, and in France, Finland, Switzerland and Vienna.

Mr. H. M. Fairweather showed slides of Sully Hospital, seven miles from Cardiff.

Dr. Vere Pearson, who said the subject had interested him for many years, made one or two criticisms of hospitals visited near Paris, pointing out that for nearly a third of a year wards facing south would be either too hot or too stuffy from the necessity of keeping the windows closed. Access to some of these wards was awkward, and there was no possibility of getting cross-ventilation. Radiators under the windows dissipated heat, and were therefore an expensive method of heating.

Dr. F. R. Walters said the present was a good time to reconsider these matters, partly because thoracic surgery had revolutionised the treatment of pulmonary tuberculosis, and partly because many people had lost faith in sanatorium methods. There was room for more than one type of sanatorium. Bed patients needed proper nursing facilities. For ambulant patients the grounds were of much greater importance than the buildings.

He stressed the importance of cool air while keeping the patient warm. It was a mistake to try and warm the patient by warm air. Ventilation might be arranged in two directions and wind screens might be valuable.

Mr. J. E. H. Roberts pointed out the importance of portable X-ray apparatus, and of ensuring that there was adequate room for this and for an oxygen tent. No room should be constructed in such a way that the bed could not be taken out with the patient. The requirements of the nursing staff should be given due consideration.

Dr. Powell said that in the Cardiff hospital described by Mr. Fairweather every patient had a view. Nurses could go under cover to any part of the building. The new developments of thoracic surgery had changed the type of building required, and the modern sanatorium approached much more to that of a hospital for acute diseases.

The session closed with a display of photographs taken by Dr. F. R. G. Heaf during the recent visit to Paris.

At the evening session Mr. J. E. H. Roberts, F.R.C.S., opened a discussion on: "Bronchiectasis in Tuberculosis."

He said that massive collapse occurred when the bronchus was occluded, especially when accompanied by straining or coughing. Only one-fifth of the air in the alveoli was oxygen, and this was absorbed very rapidly—a few minutes only. The much larger nitrogen content took considerably longer before it disappeared. Re-expansion of the collapsed part of the lung or lobe would occur easily and completely if the obstruction was removed while any gas remained in the alveoli. At a later stage, when all the air, including the nitrogen, had gone, and the walls of the alveoli were in contact, re-expansion took place very slowly, if at all. This was possibly due to surface tension between two moist surfaces in apposition.

The blocking of the bronchus might be produced in many ways: blocking of the lumen from within by mucus, foreign body, growth, etc.; alteration of the walls of the bronchus, kinking, etc.; pressure from within by aneurysm, new growth, enlarged glands, etc. The immediate effect of the sudden diminution in the volume of the lobe or lung was a great increase in the intrapleural negative pressure. This was in part compensated by the moving over of the mediastinum, if not already fixed, and by the rising of the diaphragm and the falling down of the arching ribs. If only one lobe was involved, compensatory emphysema of the other occurred. But the negative pressure was so high that these proceedings could not fully compensate, so that the bronchi, and especially the smaller branches in the collapsed lobe, were pulled over and widened. For some time, in the absence of infection, there was no structural alteration,

but later on permanent changes occurred in the walls of the bronchi, often as the result of inflammation from infection, but possibly in some cases owing to the alteration in the blood supply. Not only did changes occur in the walls of the bronchi, but the alveoli completely disappeared. The speaker believed that bronchiectasis was the invariable sequel of unrelieved massive collapse, the converse also being probably true. Massive collapse occurring in artificial pneumothorax would not completely re-expand. The term bronchiectasis should not be applied unless the dilatation was permanent. Cases of so-called bronchiectasis in children which cleared up without operation were not true bronchiectasis at all. Now coming to patients with pulmonary tuberculosis, they had found that the majority of those with so-called chronic fibroid phthisis were suffering from an advanced degree of bronchiectasis. This was not due to a slow contraction of fibrous tissue, but to a previous sudden massive collapse. The cause of massive collapse in pulmonary tuberculosis was, of course, blocking of a bronchus by blood clot—e.g., after haemoptysis; by granulation tissue—not necessarily specific in tuberculous patients; in artificial pneumothorax cases by kinking of bronchus; by the pressure of tuberculous glands, especially in children; and most common of all by a mucus plug. The consequences of massive collapse in tuberculosis were: (1) Bronchiectasis with resulting haemoptysis, cough and sputum; haemoptysis was more common and more severe in bronchiectasis than in tubercle; (2) sometimes complete arrest of active tuberculous disease, and in other cases where tubercle bacilli still persisted, the disease became certainly more benign; (3) dyspnoea, due either to dislocation of mediastinum or, more frequently, to cardiac displacement; (4) pain due to the high negative pressure in the pleura, which caused a good deal of pulling; (5) emphysema of the opposite lung. With regard to treatment of massive collapse, if this was discovered *at the time at which it occurred*, immediate treatment should be instituted. Coughing could not expel the plug of mucus, because the conditions of coughing were absent. Bronchoscopy and aspiration should be applied immediately. Intravenous injections of evipan would obviate all distress to the patient, though it made it harder for the surgeon. If granulation tissue was present, it could be treated with AgNO_3 . Ephedrine or some similar antispa modic was useful in certain cases, and this could be followed by breathing exercises where this was not contra-indicated. The treatment of bronchiectasis included postural drainage where sputum was excessive; phrenic interruption, which relieved pain, allowed return of mediastinum, thus lessening dyspnoea, reduction of sputum for some months, preceded and followed by an increase in amount. Phrenic interruption, however, was only a temporary measure; the real treatment was thoracoplasty, which usually

resulted in the sputum becoming negative and greatly decreased in volume. Lobectomy and pneumonectomy should *never* be performed for cases of bronchiectasis.

Mr. Roberts showed a number of slides illustrating various points in his paper.

Dr. Maurice Davidson, who followed, said that it had been a constant problem to determine how far the clinical variations seen in pulmonary tuberculosis were due to other factors than the activity of the tubercle bacillus. Bronchiectasis was generally believed to be a frequent, if not invariable, concomitant of various inflammatory conditions of the respiratory organs, including chronic bronchitis, pulmonary tuberculosis, non-tuberculous pulmonary fibrosis, etc. With his colleague, Dr. Lee Lander, he had been especially interested recently in the pathogenesis of bronchiectasis. Many of the cases which had formed the subject of their investigations had been examples of chronic phthisis. Apart from their observations on the incidence of bronchiectatic changes in these cases and on the conditions which were, in their view, concerned with the mechanism of its production, they had been impressed with the belief that in not a few phthisical patients it was the bronchiectasis which was responsible for certain of the symptoms, especially for the production of sputum, and not to the tuberculosis *per se*. Dr. Davidson then went on to describe two illustrative cases in young women with a past history of pulmonary tuberculosis, dating back seventeen and six years respectively. In one of these cases intramuscular injections of 50 per cent. saccharose are being given weekly, with a remarkable effect in lessening the amount of sputum.

Dr. F. P. Lee Lander, the next speaker, said that Laennec, in his original description of bronchiectasis in pulmonary tuberculosis, made some profound observations which had been rather neglected. Two of these observations he wished to stress now: (a) That there might be no change other than dilatation in the appearance of the affected bronchi; and (b) that the dilatation is always greater in the smaller than in the larger bronchi, the largest trunks being rarely affected at all. For nearly a century our knowledge of the condition did not advance, and physicians believed that infection was the fundamental change necessary for the production of bronchial dilatation, whether this dilatation was produced by traction from outside the bronchus or by increased pressure from within. Since the introduction of contrast medium radiography, however, it had become evident that bronchiectasis could exist without any signs or symptoms of infection. Moreover, if these ectatic bronchi were studied (in biopsy specimens), evidence of infection was entirely absent and the elastic tissue appeared to be present in normal amount. The staining of specimens

for elastic tissue was so unsatisfactory and the estimation of the amount of elastic tissue present was so much a matter of personal opinion that further confirmation was desirable. This confirmation could be found in cases of pulmonary tuberculosis where there was a co-existing bronchiectasis. Bronchography in one of their cases of pulmonary tuberculosis revealed the presence of a basal bronchiectasis. This patient was receiving artificial pneumothorax treatment, and it was found that with the variations in intrapleural pressures that occurred in the course of the refills the ectatic bronchi varied markedly in size, becoming wider and more dilated when the intrapleural pressure became more negative and contracting again after a refill. Mr. Roberts had also demonstrated this in a case of thoracoplasty where the bronchi became much narrower after the completion of the surgical collapse. This narrowing was not effected by any infolding or compression of the bronchial walls, but by a symmetrical narrowing which could only be due to the elasticity of the bronchial wall. This view was further supported by the published cases in which bronchiectasis disappeared after re-expansion of a massively collapsed lobe. The theory could be further tested by investigating massively collapsed lobes developing as an incident in the pneumothorax treatment of pulmonary tuberculosis. If bronchograms are taken of these lobes, distortion of the bronchi is found to be present. If no more refills are given and the air in the pleural cavity allowed to be absorbed, bronchiectasis develops. The massively collapsed areas of lung, known for brevity as "black lobes," were a frequent occurrence in pneumothorax treatment. The black lobe was of two main varieties. In one the massive collapse was due to an obstruction of the main bronchus, such as a tuberculous structure, and the bronchi distal to the block were collapsed; while in the other type there was no main bronchial obstruction, and dilatation of the bronchi was found. The black lobe, however, was not a permanent state of affairs, since re-aeration with expansion of the lung might occur, especially in the case of an upper lobe. With the onset of massive collapse, complete rest of the lung was obtained, with presumably the occurrence of complete healing of the tuberculous lesion. When re-absorption of the air was allowed to take place, re-expansion of the lung was not accomplished, but the mediastinum was displaced, the diaphragm pulled up, and dilatation of the bronchi occurred. With this increase of tension on the lung a partially healed tuberculous focus might be ruptured, and in order to avoid this it might be necessary to make the therapeutic collapse permanent either by surgical means or by the indefinite continuance of refills.

Dr. F. G. Chandler, opening the discussion, asked if they were to assume that bronchiectasis was *only* caused by massive collapse. One difficulty

of bronchiectasis was that there was no proper nomenclature and no proper classification other than that of congenital or acquired, or the clinical distinction of obstructive or non-obstructive. A transient dilatation was surely not bronchiectasis. Where bronchi were shortened they must be dilated. For bronchiectasis such dilatation must be permanent. The theories of causation were numerous and probably false. He himself thought that there was one factor common to all cases—that of *infection*.

Dr. Andrew Morland asked if it was the obstruction of the tube that caused bronchiectasis or the atelectasis. Patients with a black lobe did not stand letting out the A.P. at all well, and such patients probably needed a permanent A.P. collapse.

Dr. J. G. Scadding agreed that massive collapse was an important factor in the causation of bronchiectasis. He mentioned two cases where children presented the picture of a collapsed lobe. Lipiodol showed the bronchi of the lower lobe to be bunched together, but they were normal throughout their course. Atelectasis of the lung was therefore not necessarily associated with bronchiectasis or bronchial dilatation, nor was bl^oo^gage of the bronchus always the origin of atelectasis.

Another speaker suggested that bronchiectasis was in the first instance due to a partial paralysis of "peristaltic movements" in the bronchi comparable with abdominal ileus. Other speakers asked about the mechanism of haemoptysis, and whether and how far a study of the sedimentation reaction was helpful in deciding whether or not tuberculosis was present in a given case of bronchiectasis.

Mr. Roberts, in reply, said they were now only on the fringe of the subject, which was a very complicated one with many factors involved. A dry bronchiectasis might be of two types: one which was dry because there was no infection, and the other because it had no symptoms. An instance of this was a patient who had no cough and no sputum for three months, but the bronchus was full of pus. Bronchiectasis was an anatomical term and should be restricted to permanent dilatation. Answering Dr. Morland, he said the bronchiectasis was due to negative pressure. Evidence of the original cause was not always present at the time of bronchoscopy, nor did they always know the mechanism of haemoptysis. There was probably nothing to be gained by a sedimentation reaction as a diagnostic aid.

Dr. Lee Lander also replied very briefly, concluding that bronchial obstruction he believed to be always a cause of atelectasis.

NATIONAL ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS

SIR KINGSLEY WOOD, the Minister of Health, speaking at a reception given by the National Association for the Prevention of Tuberculosis, emphasised the importance of after-care work in the campaign against tuberculosis.

After paying a tribute to the Association for its pioneer work and for its present work of education and propaganda, coupled with the maintenance of a sanatorium colony for adolescent youths at Burrow Hill, Surrey, Sir Kingsley Wood said that the National Tuberculosis Scheme had its foundation in the years 1911 and 1912, and that we could look with legitimate satisfaction on the fact that since then the tuberculosis death rate had fallen by more than half. Factors which had contributed to this were: first, such general factors as the growth of better habits of living, the removal of slums and the great housing measures undertaken since the war, and the increased protection of the milk supply; and, second, the specific anti-tuberculosis measures taken under the National Tuberculosis Scheme by the partnership of the State, local authorities and voluntary agencies such as the National Association.

As examples of the growth of the National Scheme Sir Kingsley said that in 1911 there were some 80 tuberculosis dispensaries, 1,400 beds in local authorities' institutions and 4,200 beds in sanatoria provided by voluntary effort or privately owned. To-day we had 480 tuberculosis dispensaries covering the whole of England and Wales, while over 31,000 beds were available for the public treatment of tuberculosis; 155,000 persons (including 114,000 who were found not to be tuberculous) were examined at the dispensaries for the first time in 1936, and during that year 56,000 persons completed periods of treatment in residential institutions.

Sir Kingsley Wood said, however, that the finest institutions even with the most skilled medical personnel were not sufficient. To achieve full success the natural reluctance of persons who suspected that they were suffering from tuberculosis to have recourse to medical advice in good time must be overcome. This necessitated the health education of the people, which the National Association had done so much to promote, and which he hoped would be carried yet further by the national campaign just launched to bring home to everyone the vital importance of the slogan "Use the Health Services."

Tuberculosis was a problem which touched in a hundred and one ways both the individual and his family. In many cases a patient and his family

needed practical and often also psychological help. This assistance constituted the tuberculosis care work, and commonly the best means for giving it was a well-organised Care Committee, drawing together the various benevolent agencies of the district and acting in close touch with the family doctor and the tuberculosis medical officer of the dispensary. A Care Committee could save the wage-earner anxiety when receiving institutional treatment by helping to solve such questions as how the family were to carry on as regards rent and care of his children. The Committee could also help those who had received sanatorium treatment to obtain work under sheltered conditions and enable them to live in as healthy an environment as possible. In some cases care organisations lent beds and bedding to enable a patient to sleep by himself or assist in the boarding out of the children of infected patients. It was abundantly clear from these examples that good care work was indispensable if tuberculosis schemes were to have their full effect.

NORTH-WESTERN TUBERCULOSIS SOCIETY

A MEETING was held at Manchester on October 28, 1937, when the Presidential Address on "Radiology at a Tuberculosis Clinic" was delivered by George Jessel, M.A., M.D. (Oxon.), D.P.H. (Manchester), A.R.P.S. (Consultant Tuberculosis Officer, Lancashire County Council).

Dr. Jessel said:

One of the most striking changes that have taken place since the inception of tuberculosis schemes twenty-five years ago has been the steady increase in the use of radiology as an aid to diagnosis in cases of suspected tuberculosis. It is, unfortunately, true that progress has been slow and uneven. Indeed, until well after the Great War the use of X-rays, even by the most enlightened authorities, was irregular and spasmodic; in large areas patients were sometimes sent to radiologists attached to general hospitals, but elsewhere little or nothing in this direction was practicable. Those were the days when a diagnosis of " hilum tuberculosis" or "peribronchial fibrosis" was fashionable. Indeed, these words were frequently on the lips of general practitioners and tuberculosis officers in consequence of the reports of the radiologists. Great strides have been made since then, both as regards technique and accuracy of diagnosis, and in many centres there have existed for several years ample facilities for the production of first-class radiological work. Unfortunately, however, these facilities are still patchy and irregular, especially in small towns and rural areas. Even today, when radiology of the chest is fairly extensively practised, there

are many dispensary units which do not possess their own X-ray equipment, but prefer to rely upon outside radiologists. This policy may have some justification, but the same cannot be said of those areas where little or no radiology is done at all. I will refer to this point later on. It is thus not surprising that even in 1937 pleas are still being made¹ for an increase in the use of X-rays in the diagnosis of chest diseases in general, and of tuberculosis in particular.

It will be convenient to divide my subject into two parts: (1) A personal record of experience and procedure, based upon the taking and interpretation of almost 13,000 skiagrams at a dispensary during a period of nearly fifteen years; (2) a discussion of various matters arising out of the above and concerned both with technique and policy. For the opinions expressed the writer alone is, of course, responsible. Finally, I shall show a few lantern slides to illustrate some of the points made.

I. Methods of Procedure.

It happens that I was directly responsible for the purchase by a local authority of one of the first, if not the first, X-ray outfits installed at a Tuberculosis Clinic. In 1921, on hearing that the Disposals Board were offering for sale a "gas-tube" apparatus, and being satisfied that it was in good condition, it was purchased on my recommendation by the Lancashire County Council. The cost of the apparatus and of its installation was £210, and excellent work was done with it by the late Dr. J. L. Stewart. My own experience with a "gas-tube" apparatus lasted from the beginning of 1923 to the autumn of 1932. In those days radiology was something of an adventure, on account of the difficulty of obtaining standardisation of results, because of the rapid variations that tended to occur in the hardness of the tube. It was, however, possible to obtain very good results with gas-tubes; indeed, the nice soft skiagrams, with plenty of detail, were sometimes as good as any produced today. Intensifying screens and films were, of course, not as fast as those now in use, and consistently good results were much more difficult to obtain. Nowadays gas-tubes are a thing of the past; indeed, many people are unaware of their existence. I remember in 1930 asking a transatlantic colleague whether he used gas-tubes. His reply was: "No, we find electricity much cheaper." Since 1932 I have used a single-valve set made by Messrs. Newton and Wright to a design specially modified from what was then the standard pattern. This has proved most satisfactory. It has been used with a Cuthbert Andrews Protex-ray tube, and thus the set is all-British. The standard technique employed is one-tenth of a second with a current of 80 milliamperes, working

at 4 feet distance. Four feet is a good working distance and represents a satisfactory compromise with a view to keeping the time within reasonable limits. Nowadays, with the Levy-West fluorazure screens and faster films a longer working distance would be possible, if desired. Kilovoltages are varied according to the thickness of the patient's chest, each patient being measured. They range from 80 to 90, allowing for mains voltage drop. Films after exposure are developed for five minutes at 67° F., usually five at a time, which is as many as a tank will comfortably hold. At the Eccles Dispensary, where the apparatus is located, two afternoon sessions a week are held, and this has become the central clinic of the five, situated in a geographical area which serves a population of about 365,000. Here nearly all new cases, wherever seen, sooner or later find their way for X-ray and other examinations. Thus the X-ray afternoons take on the characteristics of a diagnostic clinic, as the opportunity is taken to study each case from various angles. For this purpose two medical officers work in conjunction, one as a clinician radiologist, the other giving useful help in chest, throat, and other examinations. Definite tuberculous cases are finished off forthwith, the patient interviewed, and the necessary line of treatment indicated. Others are referred to the dispensary nearest to their homes for re-examination, but most cases are definitely diagnosable by this combined clinico-radiological method within a fortnight. An ambulance is available on one of the X-ray afternoons, and is used to bring patients who are unfit to travel by other means. During one X-ray session anything from fifteen to twenty-five examinations may be made, and these include non-pulmonary as well as pulmonary cases. A session usually lasts about three hours, and the staff for X-ray purposes consists of one medical officer, two nurses, and a technical assistant. On the following morning the three officers comprising the medical unit of the area meet to consider and discuss the dossier and skiagrams of each patient. These conferences are of the greatest value. The opportunity is also taken to record in a suitable index book cases of special medical interest, whether tuberculous or not. This, of course, is quite outside the official requirements of dispensary practice, but is desirable if any approximation to the high standard of teaching hospitals is to be reached. Lantern slides of interesting and unusual cases are subsequently prepared. Thus, a permanent collection of skiagrams and lantern slides has been made illustrating the various conditions and aspects of disease that have been met. Reduced prints of characteristic or interesting skiagrams are also sent to the patient's medical attendant. This, in brief, illustrates the radiological procedure I have employed more or less for nearly fifteen years.

Screenings.

These are done regularly at the beginning of each session as regards patients attending for artificial pneumothorax refills. A refill clinic is conducted on the X-ray afternoons by another medical officer. Screenings are not done for diagnostic purposes, as the information derived is subjective and regarded as being of questionable value. A skiagram constitutes a permanent record which can be seen and discussed at any subsequent time.

Stereoscopy.

At one time this method seemed likely to become increasingly important, but experience has not borne out this expectation. We have a stereoscopic attachment to our apparatus, but now seldom use it, because lateral and oblique positions serve in nearly all doubtful cases to provide the information that is required. It must also be remembered that many persons do not possess stereoscopic visual power.

Tomography.

I have no personal experience of this, but look forward with interest to the development of the inexpensive attachment which Dr. E. W. Twining, of Manchester, has been elaborating and perfecting.

Paper Films.

Although most people prefer not to use paper negatives for diagnostic purposes, they are quite satisfactory for the routine examination of old cases, and particularly of patients receiving artificial pneumothorax. Moreover, the cost is only one-half that of celluloid films. There is, however, less latitude in exposure and development than with ordinary films.

Shock-Proof Apparatus.

Accidents in X-ray departments have fortunately been extremely rare, but shock-proof tubes are now obtainable for those who are willing to pay the heavy additional cost. The risks of shock depend upon the height of room, the lay-out of the apparatus, and the degree of carefulness on the part of the operator. Where the ceiling is low and the room unduly small, so that the apparatus is crowded, the risk can be appreciable, especially if those in charge are inexperienced or careless. On the other hand, where the X-ray room is large and lofty—*e.g.*, height 9 to 11 feet—and the apparatus is in the charge of a suitable operator, the risks may be dismissed as negligible.

When should X-Rays be used?

It is arguable that radiological methods are only necessary on occasions more or less frequent, depending upon the personal factor, when the physician finds that ordinary clinical methods are insufficient to enable him to satisfy himself as to the diagnosis of a case. It is a fact that some experienced physicians have in the past by clinical methods alone achieved a remarkable degree of accuracy in diagnosis. Their clinical instinct, which we now know to be closely related to a thorough and careful, detailed examination of each case, coupled with an exceptional facility for recalling similar or related cases, has sometimes been little short of uncanny. Unfortunately, the number of such gifted men at any one time is relatively few, and with the extension of the provision made for the diagnosis and treatment of tuberculosis some adjunct, such as radiology, which would render accurate diagnosis easier for the average physician was needed, and its appearance was timely. Thus, routine X-ray examination of patients is desirable where a diagnosis by ordinary clinical methods cannot easily be made by a practitioner of experience. In this connection the following points may be made:

1. In cases where physical signs are slight or absent, valuable time may be lost in attempting to discover the undiscoverable by ordinary clinical methods. It is now well known that X-ray examination frequently reveals distinctive shadows in the absence of any physical signs whatever.

2. The regular use of radiology is of great assistance in enabling a physician to check his physical signs, and it is surprising how often these are found not to be in accordance with the findings of X-ray examination.

3. The practice of serial radiography—that is, X-ray examination of the same patient at intervals—is of great value in the study of what may be described as “living pathology” in enabling the course of a case to be followed; thus, the formation of cavities, fibrosis and calcification can be followed by serial X-ray examination in a manner difficult, if not impossible, by ordinary clinical methods.

Suspected cases of bronchiectasis may be confirmed by lipiodol and bone and joint cases referred to tuberculosis dispensaries, as possible cases of tuberculosis can likewise be X-rayed. In connection with artificial pneumothorax refills X-ray examination is essential. Screenings and skiagrams both have their place. Where the interval between each refill is one week or longer, screening should be done before each refill and the appearances recorded on a diagram. Skiagrams should be taken after refills for record purposes every six or eight weeks, but the intervals may be shorter or longer according to the circumstances of the case.

In 1933 I wrote as follows:³ "Diagnosis has of recent years become much more precise as the result of the intelligent use of good X-ray apparatus. In cases of suspected fracture, failure to use such facilities ranks as negligence, and I think the time is not far distant when a similar view will be taken in cases where there are reasonable grounds for suspecting tuberculosis." This view has received striking confirmation by a recent decision in the Court of Appeal (*Connolly v. Rubra*). According to the account published in the *Lancet*⁴ Lord Justice Greer remarked: "Tuberculosis is one of many diseases with which a general practitioner commonly has to deal. If the doctor has any doubt whether or no there are signs of tuberculosis, it is his obvious duty to make further examination to resolve that doubt, and to make it clear that nothing further could be done for the patient. A doctor who is not over-confident of his own judgment will, when he finds himself in a difficulty, call an expert and decide according to the expert's advice. To enable the expert's opinion to be of value, it is not enough to do what Dr. Rubra did at a later date—namely, to take one specimen of the sputum and be content with that if the result is negative; he must take many specimens of sputum and, in addition, he ought to have an X-ray examination, and to watch the patient to see whether he is progressing or going back as time goes on." It is thus clear that it is the duty of local authorities to make satisfactory provision for X-ray examination at or in connection with their tuberculosis clinics.

On the other hand, a few words of caution as to the possible abuse of radiology are necessary. There is an uncomfortable feeling in the minds of many of those who, like myself, consider radiology as an indispensable adjunct in the diagnosis and treatment of tuberculosis that too much reliance may be placed upon this valuable procedure by those who have not troubled to learn properly or to utilise the time-honoured methods of examination. As Sir Arthur MacNalty⁴ has recently said, "pulmonary tuberculosis still reveals itself by physical signs and symptoms; in other words, inspection, palpation, percussion and auscultation are not displaced, but reinforced, by a skiagram of the chest."

The disadvantages resulting from a reluctance to use X-rays are: (1) The longer time that is usually needed to reach a diagnosis, (2) the tendency to play for safety and to diagnose non-existent tuberculosis. Radiology is, moreover, particularly useful in aiding the differentiation of non-tuberculous chest conditions. On the other hand, radiology alone cannot be relied upon to provide an accurate diagnosis, and in many cases that present difficulty the information supplied thereby is equivocal. For example, the X-ray appearances in cancer, tuberculosis, or silicosis may at times be indistinguishable. Likewise, an opacity may be due to fluid,

a thickened pleura, or underlying new growth. Consistently accurate diagnosis depends upon a careful appraisement of all the available evidence, including history, clinical and laboratory examinations, as well as X-rays. It demands experience and judgment, for in some respects radiology has tended to make the diagnosis of chest diseases more difficult. This is particularly true as regards the few who cannot see the wood for the trees, and confuse shadows of bronchi and bloodvessels seen in their varied aspects and angles with evidence of non-existent disease. There is a pre-tuberculous condition discoverable by X-rays as well as by clinical methods, and it is possible in a dark room to imagine that one sees a black cat that is not there. It is to be hoped that all those, whether doctors or laymen, who are concerned with anti-tuberculosis schemes will realise the true scope and value of radiology and appreciate the fact that it is not the gun, but the man behind the gun, that counts most.

By whom should X-Ray Examinations be made and interpreted?

It is sometimes argued that X-ray examinations should only be made by a whole-time radiologist, on the ground that he is not likely to be biased by any clinical knowledge of the case. This view is open to grave objection; indeed, many radiologists nowadays specially ask to receive clinical information of patients referred to them. In this connection the following points may be made: (1) It is admitted, even by expert whole-time radiologists, that by radiology alone the diagnosis of tuberculosis and other chest conditions often cannot be made; indeed, the number of such cases has been placed as high as 40 per cent. Consistently accurate diagnosis of chest diseases depends upon an accurate assessment of all the available evidence, clinical, bacteriological, radiological, etc. The physician who is making the diagnosis is in the position of a magistrate who has to weigh the whole of the available evidence, and there is no *a priori* reason why he should be biased by clinical examination, any more than by radiological findings. It is his business to weigh the evidence as a whole, and this is the method which has been found of great utility at those dispensaries and clinics where radiology is carried on by the tuberculosis officers themselves. (2) A radiologist who has no clinical experience and is not regularly engaged in clinical work has an insecure foundation on which to base reports and findings in the skiagrams he takes. The tuberculosis officer or physician who is regularly X-raying his own cases is constantly checking both his clinical findings and the appearances in the skiagrams, and so obtains a good working knowledge of the value of both.

In sparsely populated districts it would be uneconomical to have an

X-ray apparatus at each dispensary; indeed, this is not the case even in urban districts. Wherever possible, there are, however, obvious advantages in having X-ray facilities either at or adjacent to a central dispensary. The ideal method is for a member of the tuberculosis medical staff, who is interested in this work to act as radiologist. It is neither necessary nor desirable for every medical officer to practise radiology, as it is almost impossible thereby to obtain a uniform high standard of efficiency. There should, however, always be a second man available as deputy to the principal radiologist. Where an outside radiologist is preferred or has to be employed, the nearer he is to the clinician the better, as otherwise close and effective co-operation becomes difficult, if not impossible. Where payment is made per capita, there is grave risk that in the effort to secure economy the amount of radiology will be unduly restricted. It is well known that thousands of pounds have in the past been wasted owing to the occupancy of beds for the tuberculous by non-tuberculous cases, and most of this loss could have been avoided by a relatively small expenditure on X-ray work.

Finance.

The cost per skiagram in my unit has been worked out at 9s. 6d. This figure, for which I am not responsible, includes depreciation based upon an estimated life for the apparatus of ten years. All items of expenditure have been taken into account, including a proportion of the cost of staff salaries, rent, heating, lighting, cleaning, etc. No credit has been allowed for screenings to the number of 500 to 600 a year.

It is thus clear that, granted the existence of an X-ray apparatus and suitable staff, the cost per skiagram falls with an increase in the number taken. A wise discretion in this matter is, however, desirable if the best use is to be made of the time and energy of the staff, having regard to their other duties.

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OBITUARY

DR. F. W. BURTON-FANNING

DR. JANE WALKER writes:

Dr. F. W. Burton-Fanning, who died on October 23, 1937, at his home in Newmarket Road, Norwich, was one of the pioneers of the modern open-air treatment of tuberculosis. He began to treat patients on these lines in the spring of 1893, and continued a firm believer in and practitioner of that method of treatment in all its modern developments from that time onwards. Both Kelling and Mundesley will be for ever associated with his name. In addition to this enlightened piece of work he carried on an active practice of a purely consulting kind. I remember his telling me he had not one single patient of his own; he was, indeed, that *rara avis* of the medical profession, a pure consultant. Early on in his practice he became known as an accurate diagnostician, especially, of course, in pulmonary diseases, though his knowledge of general medicine was extensive and accurate.

He was, indeed, a type of the great physicians, and scrupulously honest in his dealings with all his fellow-practitioners. He never sought any publicity—indeed, he hated and shunned it—but by his friends, and they were many, he was regarded with high esteem, and in those who were privileged to work with or under him he inspired real devotion. He will be very much missed by them.

REVIEWS OF NEW BOOKS

American Medicine: Expert Testimony out of Court. The American Foundation: New York, 1933. Two volumes. Pp. 1435.

This comprehensive work is a report of an enquiry among medical men on the organisation of medical care in the United States.

The purpose of the report is to illuminate and not to prove. Enquiry was made of three groups of doctors: those who had been in practice for twenty years or more, those who had been in practice from five to twenty years, and thirdly those who had been qualified for less than five years.

The enquiry was very thorough and in effect was as follows: Has your experience led you to believe that a radical re-organisation of medical care in this country is indicated? If so, in what direction? If not, what, if any, change in the present system would you like to see made? What evolutionary possibilities would you stress?

Some of the replies advocated revolutionary and others evolutionary or gradual changes; some thought no change necessary. The editors have set down the views for and against each question with creditable impartiality. Thus we are given the views of an Illinois doctor: "I have practised medicine in this locality for twenty-seven years; during that time I do not know of anyone who has suffered from lack of medical care." And of another: "Last year there were more than 800 deaths in Georgia without an attending physician."

The cost of medical care is fully discussed and the duty of the state towards those needing it. A common opinion is that medical care is only one of the many necessities. One doctor writes: "Why pick on medical care? Why not socialise the food supply, rent, light, heat and clothing, or why not socialise the legal profession?"

The problem of medical education is fully discussed, and the views expressed by the different doctors make very interesting reading.

With regard to specialisation it is asked: What is a specialist? One doctor cynically remarks that the term specialist indicates ignorance in most subjects rather than special knowledge in any one. It is generally conceded that the growth of medical knowledge makes it impossible for any one individual to cope with the whole subject and that specialisation is necessary, but it is pointed out that a patient rarely suffers from defect in one organ alone, since impairment of one function involves that of others.

The use and abuse of group practice is also considered, and the reader is left with the definite impression that there are disadvantages as well as advantages to this system.

The place of the hospital in medicine, the cost to the patient of medical

and surgical treatment, and especially of special investigation, such as radiography, blood tests, and other pathological and bacteriological examinations, are now often required, and indeed the patient may claim for negligence if they are not done. Can he expect all this for the same price paid by his grandfather to the doctor who simply looked at his tongue?

Experiment and research, public health, and the pros and cons of state or semi-state medicine are fully considered, and the whole work is one that will repay reading and digesting. It will be found a great stimulus for thought on the problem of sickness and medical care. It may be said that modern medicine prolongs the life of the weaklings, but it also prevents disease amongst the healthy, as can be shown by the enormous fall in the tuberculosis death rate.

The reduction of infant mortality is remarkable, and if fewer babies are born in certain countries many more of them grow up to healthy adult life.

The problem of health is an international one, and these volumes contain information valuable not only to the United States, but to the whole world.

Collapse Therapy of Pulmonary Tuberculosis. By JOHN ALEXANDER, B.S., M.A., M.D., F.A.C.S.; Professor of Surgery, University of Michigan; Surgeon-in-Charge, Division of Thoracic Surgery, University of Michigan Hospital. London : Baillière, Tindall and Cox, 1937. Pp. 706, with 367 figs. Price 67s. 6d.

That a book of this size has been written on the subject of collapse therapy is evidence of the importance attached to this method of treatment by the medical profession.

The chapter dealing with the history of collapse therapy is of great interest, and the author refers to the early days of artificial pneumothorax, the evolution of thoracoplasty from the early operation of Wilms to the modern technique. As progress was made, a bad pneumothorax was often converted into a good one by internal pneumolysis. The phrenic operation was then practised, and other procedures such as intercostal nerve paralysis, scalenectomy, and oleothorax were advocated.

A full chapter is given to the choice of operation with suggested collapse therapy for eighty-four illustrated types of pulmonary and pleural lesions.

The chapters on artificial pneumothorax are written by S. J. Blair Barnwell, who offers a warning against over-enthusiasm for pneumothorax and refers to unnecessary induction at one extreme and hopeless induction at the other. Between these two, he says, there is also the danger of an attempt to substitute pneumothorax for rest and sanatorium treatment and of prolonging an inefficient pneumothorax when it should be abandoned in favour of other methods.

Details of technique of every operation described are given and the author frankly discusses the disadvantages of each procedure. The advice as to treatment and management of the patient before and after an operation will be found useful.

There are chapters by Max Pinner on the physiological principles of collapse treatment and the pathology of pulmonary collapse which are very

interesting and include views as to the cause of atelectasis and its result. Also the pulmonary circulation in the collapsed lung is described in these chapters.

Dr. Kirby Smith Howlett contributes a chapter on oleothorax, including its indications, contra-indications and dangers.

The author is to be warmly congratulated on a comprehensive work in which is set out every detail of modern collapse treatment.

The book is very well illustrated and produced. It contains 1,342 references and concludes with an excellent index.

Manual of Tuberculosis. By E. ASHWORTH UNDERWOOD, M.A., B.Sc., M.D., D.P.H., Medical Officer of Health, County Borough of West Ham. Edinburgh: E. and S. Livingstone, 1937. Pp. 404. Price 8s. 6d.

The second edition of this little volume is written on the same plan as the first, but is revised and enlarged. In the introduction Professor Currie remarks that there are many books on tuberculosis for the student or practitioner, but that this book fills a gap in supplying one for nurses. It is intended for nurses and public health workers, and the author is to be congratulated not only in condensing so much valuable information into a small space, but also in his discretion in drawing the line between the functions of the doctor and of the nurse. A brief description of all the problems of tuberculosis are given, including infection, the reaction of the body to the tubercle bacillus, tuberculosis of various organs and treatment. The duties of a nurse at a sanatorium are discussed in one chapter and another is devoted to the private nursing of tuberculous patients.

The book can be warmly recommended to nurses and health visitors in tuberculosis.

Thoracic Surgery. By FERDINAND SAUERBRUCH, Professor of Surgery in the University of Berlin; and LAURENCE O'SHAUGHNESSY, F.R.C.S., Consulting and Thoracic Surgeon to the British Legion Sanatorium, Preston Hall, and to the Lambeth Cardiovascular Clinic. London: Edward Arnold and Co., 1937. Pp. 394. Price 50s.

Professor Sauerbruch is so well known in this country as a pioneer of thoracic surgery that this book will be welcomed by everyone interested in the subject. It is well translated and produced, and there are many illustrations which are first class, and even the radiographs, which so often reproduce badly, are as clear as the originals.

It is perhaps remarkable that the treatment of tuberculosis is given so little space. Thoracoplasty, with its indications, technique and complications, is dealt with and extra-pleural plombage is described, but artificial pneumothorax is dismissed very briefly; no mention is made of extra-pleural pneumothorax or of Sembs' combined upper thoracoplasty and plombage operation, which is now so much employed.

The section dealing with mediastinal infections and tumours is especially good; the cases described are very instructive.

The appendix deals with the surgical treatment of cardiac ischaemia,

which is so clearly and well described that one wishes more space could have been allotted to it. The history of one patient is given, and this alone is enough to encourage the hope that the operation has a great future in certain cases of cardiac failure.

The book is a welcome addition to the literature of thoracic surgery, and should find a place in the library of every surgeon and all who are interested in disease or injury of the thoracic organs.

Pulmonary Tuberculosis in Practice. By R. C. WINGFIELD, M.B.(Oxon.), F.R.C.P.(Lond.), Medical Superintendent to Brompton Hospital Sanatorium, Frimley. London: Edward Arnold and Co., 1937. Pp. 122. Price 9s.

In this book the author has traced the life history of a tuberculous lesion through its possible stages of development. It contains a large diagram which illustrates the twelve possible stages, in one of which any given lesion will be found; but it is made clear that a patient may, and often does, have several lesions which need not all be in the same stage of development. Thus a patient may have a healed lesion which needs no treatment, a secondary which needs rest in bed, and a cavity which needs obliteration by some form of collapse.

The author conceives the initial pulmonary lesion in the adult as an allergic inflammatory condition which may heal completely or leave some active or potentially active islets which may spread and produce various types of tuberculous lesions shown in the diagram and described in the text. The clinical picture with symptoms, physical and radiological signs, course and treatment of each lesion is described.

The last part of the book consists of seven short chapters dealing briefly with special aspects connected with diagnosis and treatment, including the Mantoux and sedimentation tests, and brief description of the treatment and significance of haemoptysis, pleural effusion, ischio-rectal abscess and spontaneous pneumothorax, and tuberculous laryngitis.

The book is original and a truly valuable addition to the literature. It is no mere hash of other people's work, nor is it the armchair dream of a theorist. It contains the personal opinion of the author, who has devoted and is devoting his life to the practical treatment of tuberculous patients.

Everyone interested in the problem of tuberculosis should read this book.

Annual Report of the Chief Medical Officer of Health for the Year 1936. H.M. Stationery Office. Price 4s.

"One cannot but feel pride in this hundred years' review of preventive medicine. So much has been gained, so much health, vitality and happiness have replaced destitution, ignorance and despair."

With these words Sir Arthur MacNalty, Chief Medical Officer of the Ministry of Health, concludes the introductory chapter of his Annual Report for 1936.

The statistical records for 1936 reflect the revolution that has taken place. The crude death rate was 12.1 per 1,000 living, compared with

22.4 in the eighteen-forties; the infant mortality rate was 59 as against 153. The number of infants who died under one year of age was 35,425, less than half the number who would have died under the conditions of as little as thirty years ago. The death rates for both respiratory and non-respiratory tuberculosis were lower in 1936 than ever before; the standardised death rate from all forms of the disease was 657 per million, which may be compared with an average of 3,476 in the fifties of last century. The Report notes as "particularly satisfactory" the fact that tuberculosis mortality among young women is now again declining, and at an increasing pace.

An interesting account is given of the serious outbreak of enteric fever in Bournemouth, Poole and Christchurch in the summer of 1936, and of two other outbreaks in which also the vehicle of infection was raw milk.

There is again an increase in mortality from cancer. The number of deaths was 66,354, an increase of 1,847 on the previous year, which is a larger increase than that in 1935 over 1934. The question of the pressing need for a wider provision of facilities for diagnosis and treatment, as well as the need for further co-operation by local authorities, is fully discussed.

The Report refers to the first report of the Advisory Committee on Nutrition, which described the consumption of a sufficient quantity of milk as "the key to proper nutrition." Since the Report was published the Government have announced their intention of increasing the consumption of milk, especially among nursing mothers and infants. Reference is also made to the noteworthy publications dealing with various aspects of human nutrition which have been issued by the Health Section of the League of Nations, and to the dietary surveys and nutritional investigations in which the Ministry is concerned.

The Report commends properly operated milk bars. "There can be no question about the nutritional value of the average 'milk shake.'"

Further evidence is given in support of the contention that there is no significant difference in nutritive value between raw and pasteurised milk.

Collected Papers on Tuberculosis. By Sir ROBERT PHILIP, M.A., M.D., LL.D., F.R.C.P., Extra Physician to His Majesty the King in Scotland; Consulting Physician Royal Infirmary, Edinburgh; Professor of Tuberculosis and Examiner in Medicine, Edinburgh University. Oxford University Press, London, 1937. Pp. 460. Price 21s.

In 1882 Robert Koch discovered the tubercle bacillus, an epoch-making discovery which fascinated Robert Philip, then a newly qualified doctor. Since that time he has devoted his life to the study of tuberculosis, and more especially to its prevention. It is to him that we owe the tuberculosis dispensary.

In 1887 he established the Victoria Dispensary for Consumption in Edinburgh, and at that time he wrote that the function of the institution included:

(a) The reception and examination of patients at the dispensary, keeping a record of everyone thus received, with an account of his illness, history, surroundings and present condition, the record being added to at each subsequent visit.

- (b) The instruction of patients how to treat themselves and how to prevent or minimise the risk of infection to others.
- (c) To dispense the necessary medicines, disinfectants, sputum bottles and, where the family condition seemed to warrant it, foodstuffs and the like.
- (d) To visit patients in their own homes, more especially patients confined to the house or bed, and this for the purpose of treatment and of investigation into the state of the surroundings and home conditions, and risk of infection to others in the neighbourhood.
- (e) The selection of more likely patients for hospital treatment, either the early case for sanatorium or the late case for some incurable institution.
- (f) Instruction of patients and friends of patients and other enquiries on questions relating to consumption.
- (g) Bacterial examination of expectoration and other discharges.

What now, fifty years later, could we add to this? The author also conceived the sanatorium in connection with the dispensary, hospital for advanced cases, and the colony for after-care. He it was who advocated notification, and it was chiefly to his endeavours that tuberculosis became a notifiable disease. He appreciated the danger of sanatorium treatment producing habits of indolence and idleness. Patients, he said, should not lead an idle existence, his idea of a sanatorium being that of a busy hive where patients, subject to doctors' instructions, contributed to its upkeep. He was always an advocate of the importance of fresh air, and pointed out how primitive races and animals living under conditions of nature did not become tuberculous. Tuberculosis is the child of civilisation and is the outcome of conditions which the human race themselves had created.

In this book will be found the story of Koch's discovery of tuberculin, of its effect, and the hopes and disappointments which followed. As regards tuberculin, the author points out that its value is not generally appreciated. The discovery of tuberculin has, he says, revolutionised our views on tuberculosis. We know how many apparently healthy people are infected. In veterinary work tuberculin alone can enable the farmer to produce tuberculosis-free herds.

This volume is one of real interest. The author modestly pays tribute to Koch and his work, but it is to Sir Robert Philip more than anyone else that we owe the steady decline in the incidence and death rate from tuberculosis during the last half century, and this volume of collected papers of a great man is a valuable contribution to the literature on the tuberculosis problem.

Report on the British Health Services. P.E.P., Queen Anne's Gate, London, 1937. Pp. 430. Price 10s. 6d.

The Political and Economic Planning (P.E.P.) is a non-political group consisting of working members, such as industrialists, officers of local and central government, doctors, teachers, etc., who give part of their spare time to fact-finding and suggesting possible advances over a wide range of social and economic activities. In connection with this report we refer

our readers to a comprehensive work, "American Medicine," which we reviewed in our January number.

The basis is a survey of the essential facts and figures about all the health services. Over and above this the authors have summarised and reviewed previous reports and interviewed and corresponded with many health authorities in preparing an outline synthesis of what appears to be informed opinion on as many as possible of the various problems. Finally, the Health Group and other P.E.P. groups have taken certain outstanding problems and given them special consideration. The sections so treated which are the most essential to consult in order to judge the report are:

- (A) Chapter XVI.: The Health Services Reviewed.
- (B) Pages 161-165: Medical Practice and the Health Service.
- (C) Pages 327-337: Proposals on Nutrition.
- (D) Pages 211-229: Proposals for extending National Health Insurance.
- (E) Chapter XV.: Extent and Cost of Ill-Health.
- (F) Chapter III.: Industrial Health (and the New Factories Act).
- (G) Chapter VIII.: Review of the Hospital System.

The section dealing with tuberculosis will no doubt appeal especially to our readers, but the tuberculosis officer will be the first to agree that the whole report is one of considerable importance, because a higher standard of living, better housing, and improved general health of the public are very important factors in reducing the incidence and mortality of tuberculosis.

The Potts Memorial Hospital.

We have received a review of the activities of the first ten years of the Potts Memorial Hospital, which has been produced by the Livingston Press, operated by the patients at the hospital. The Potts Memorial Hospital, which is situated in Livingston, New York, has fifty-five beds and is intended to serve as a half-way station between the sanatorium and the job. Here the patient is taught to regain his confidence and is educated and trained physically for employment. It must not be forgotten that a scheme such as this cannot be judged as an ordinary business. The profit is social in that it restores to health and ability to work those who are physically handicapped, and as a result society gains financially, because many who would have to be maintained by the State can at least partially keep themselves. It is stated that the success of a "private factory is judged by the percentage of monetary return per dollar invested," that of the sheltered workshop by "the number of disabled persons it has rendered self-supporting per dollar invested." The workers begin with a very low productivity, but when they attain a normal output they are sent out into industry.

During the first ten years 344 patients were admitted to the hospital, and 40 of them are still there; 246 remained over four months, and of these 54 per cent. were fully and 23 per cent. partially rehabilitated, leaving 23 per cent. who were not rehabilitated.

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It is being more and more recognised that treatment of the tuberculous subject does not end with sanatorium treatment. To send a patient from a sanatorium straight into industry, where he has to compete with healthy competitors, is like putting into use a broken vase before the mending material has fixed. Those who regard after-care of the tuberculous as merely a matter of humanity make a mistake; it is also economically sound, and we hope that the Potts Memorial Hospital will continue its good work.